



ISSN: 0975-833X

Available online at <http://www.journalcra.com>

INTERNATIONAL JOURNAL
OF CURRENT RESEARCH

International Journal of Current Research
Vol. 15, Issue, 05, pp.24599-24602, May, 2023
DOI: <https://doi.org/10.24941/ijcr.45205.05.2023>

RESEARCH ARTICLE

A PROSPECTIVE STUDY OF DEFORMITY CORRECTION USING PONSETI TECHNIQUE IN IDIOPATHIC CLUBFOOT

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ARTICLE INFO

Article History:

Received 18th February, 2023
Received in revised form
20th March, 2023
Accepted 14th April, 2023
Published online 15th May, 2023

Key words:

Ponseti, CTEV, Idiopathic Clubfoot,
Pirani Score, Compliance.

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Citation: VijayaKumar S Kulambi and Nithin Thomas George. 2023. "A prospective study of deformity correction using ponseti technique in idiopathic clubfoot". *International Journal of Current Research*, 15, (05), 24599-24602.

ABSTRACT

Introduction: Idiopathic congenital talipes equino varus is a complex deformity which is difficult to correct. The treatment of clubfoot is controversial and continues to be one of the biggest challenges in Paediatric Orthopaedics. Most Orthopedicians agree that the initial treatment should be non surgical and should be started soon after birth. We aimed to study a short term follow up of 75 patients treated by the Ponseti method at the Department of Orthopaedics, J.J.M. Medical College, Davangere to assess the efficacy of the treatment modality. **Materials and Methods:** 75 patients of idiopathic CTEV underwent the Ponseti method of treatment at Department of Orthopaedics in Chigateri Government Hospital, Davangere and Bapuji Hospital, Davangere attached to JJM Medical College, Davangere, during the period of from September 2020 to September 2022. Patients were followed up regularly every week during treatment and monthly after the completion of treatment. The severity of foot deformities were graded as per Pirani's scoring system before treatment at follow up and after completion of treatment and results were assessed. **Results:** Out of 75 patients good results were obtained in 69 patients. 6 patients developed recurrence of the deformity due to noncompliance with Dennis-Browne splint. **Conclusion:** The Ponseti method is a safe and cost effective treatment for congenital idiopathic clubfoot and radically decreases the need for extensive corrective surgery. There is high level of parent satisfaction regarding the correction of deformity. Non compliance with orthotics has been widely reported to be the main factor causing failure of the technique.

INTRODUCTION

Clubfoot, also called as "Congenital talipes equinovarus" or "CTEV". It is idiopathic and one of the commonest congenital condition. It is a severe anomaly of foot, needs to be corrected. Nicolas Andry (1743), described the term "Pedis Equinal" in his "Orthopaedicia" which means foot of the horse. The term "Talipes Equinovarus" is derived from latin language, Talus means ankle, Pes means foot and equinus means horse like (plantar flexed) and varus means adducted and inverted.¹ The incidence of congenital talipes equinovarus is 1-2 per thousand live birth totaling around 100000 baby is born with this deformity every year, among which 80% are born in developing nations^{2,3}. There are studies mentioning that the incidence of clubfoot is increasing, making it a challenge for us to treat it with more specific and accurate methods. Gartland's famous observation of clubfoot in 1964 was "We are still crippling with a problem the cause of which is not known, the pathological anatomy of which is uncertain, the behavior of which is uncertain and the treatment of which remains controversial"⁴. This stands good even today. The congenital clubfoot is a complex three-dimensional deformity having four components: equinus, varus, adductus, and cavus⁵. We reserve the term supination for combined movements of adduction, flexion, and

inversion, and the term pronation for combined movements of abduction, extension, and eversion. The term heel varus is used for movements of inversion and adduction of the calcaneus, and the term heel valgus is used for eversion and abduction of the calcaneus. The term forefoot supination is used for movements of inversion and adduction of the forepart of the foot and the term forefoot pronation is used for eversion and abduction of the forepart of the foot. Equinus refers to an increased degree of plantar flexion of the foot. Cavus refers to the increased height of the vault of the foot. The purpose of the treatment of CTEV is to reduce the deformities with painless functional plantigrade foot with good mobility without any modified shoes and within cosmetically acceptable limits. The recent trend for clubfoot treatment includes series manipulation, stretching, immobilization, and for the relapse and resistant cases management includes soft tissue releases osteotomy immobilization. The methods described by J.H. Kite, Ignacio V. Ponseti and French are conservative. Amongst these, the technique described by Ignacio V. Ponseti which includes gradual and sequential correction of all deformities by manipulation and immobilization with cast at about weekly interval gained maximum popularity. So the study of correction of clubfoot deformity by Ponseti technique is done to analyze its effectiveness and functional outcome in children below one year of age and without any prior treatment for the same.

MATERIALS AND METHODS

Our prospective study is a series of 75 cases of CTEV treated by Ponseti method at Department of Orthopaedics in Chigateri Government Hospital, Davangere and Bapuji Hospital, Davangere attached to JJM Medical College, Davangere during the period of from September 2020 to September 2022. Patients will be followed up regularly every week during treatment and monthly after the completion of treatment. The severity of foot deformities will be graded as per Pirani's scoring system

Source of data: Patient of both sexes less than 1 year age group in general population presenting with congenital talipes equino varus to the Orthopaedic Department of Bapuji Hospital and Chigateri General hospital attached to J.J.M. Medical College, Davangere.

Method of Collection of Data

Sample Size: 75 Paediatric patients less than 1 year of age with CTEV who are willing for treatment during the period of study. They are clinically evaluated. Informed and written consent of the parents/guardians will be taken.

Inclusion criteria

- Children less than 1 year of age with idiopathic clubfoot
- Patients who are willing to follow up in our department

Exclusion criteria

- Patients aged more than 1 year of age
- Neglected, Relapsed club foot.
- Patients who are unfit and noncompliant to the described technique.
- Patients that have undergone prior surgical intervention for clubfoot
- Patients who refused our protocol

RESULTS

The present study consists of 75 cases of CTEV corrected by Ponseti Technique .The study period was from 1st september 2020 to 31st September 2022. Patients were labeled as having a good result if all deformities get corrected by Ponseti technique alone at final follow up However if relapse is seen during follow up , such patients were kept under fair result. In the present study about 90% of patients showed good results and about 10 % had Fair result.

Table 1. Sex Distribution

Sex	Number of cases	Percentage
Male	45	60%
Female	30	40%
Total	75	100%

Table 2. Table Showing Side Affected

Side	No of cases	Percentage
Right	17	22.66%
Left	18	24%
Bilateral	40	53.33%
Total	75	100%

Table 3. Mobility of Foot

Foot	No of feet	Percentage
Supple	100	86.95%
Rigid	15	11.11%
Total	115	100%

Table 4. Showing Pretreatment Pirani Scores (According to Pirani)

Group	Score	No of feet	Percentage
1	1.5-2.5	15	13.05%
2	3.0-4.5	60	52.17%
3	≥5	40	34.78%
Total		115	100%

Table 5. Need For Tenotomy Among Different Groups

Group	Tenotomy done	
	Foot	%
1	0	0%
2	54	90%
3	40	100%

Table 6. Number of Casts

Group	No of feet	Total no. of casts	Mean no. of casts
1	15	70	4.66
2	60	310	5.16
3	40	330	8.25
Total	115		

Table 7. Compliance With Dennis Browne Splint

Compliance with treatment	No. of patients	Percentage
Yes	69	90%
No	6	10%

Table 8. Complications

Complications	No of feet	Percentage
Abrasions	6	5.2%
Slippage of cast	4	3.5%

Table 9. Results of treatment at final follow up

Result	Number of cases	Percentage
Good	69	90%
Fair	6	10%

DISCUSSION

A clinical study on one of the most common congenital deformity of foot i.e. Congenital talipes equinovarus was carried out in Department of Orthopaedics, JJMMC, Davangere to evaluate the early results of the conservative treatment using Ponseti technique. In total, there were seventy five children treated by Ponseti technique.

SEX INCIDENCE: In our study there were 45 male and 30 female children that is 60% and 40% respectively. Incidence of males and females in our series is not very different from other reported series. Kite in the series of 1509 cases reported 70% males and 30% females⁶.

LATERALITY: As regards laterality, 40 of our cases were bilateral (53.33%) and 35 were unilateral (46.66%) (17 right and 18 left sided) which is in concordance with other series presented by Wyne Davis (44% bilateral and 56% unilateral).⁷ Chung reported bilaterality in 55.75% of cases. Ponseti found 40% bilateral cases.⁸ M Changulani et al in their study reported 52% bilateral and 48% unilateral.⁹

Family History: In the present study positive family history was ascertained in 13.33% of Patients. Similar incidence of 17.9% of positive family history has been observed by Turco.¹⁰

PIRANI SCORES: In the present study clubfoot deformity was classified, according to the Pirani scoring system into 3 groups. Group-I with a Score of 1.5 to 2.5 points was seen in fifteen feet (13.05%), Group-II the most common category, with a Score of 3 to



Case 1. 10 weeks old male child with unilateral clubfoot(left), all the deformities were corrected in 5 casts with good results without the need for tenotomy

4.5 points was seen in sixty feet (52.17%) and group-III with a Score of ≥ 5 points was seen in forty feet (34.78%). We found that those feet belonging to Group I and II were more amenable to correction and responded relatively early when compared to those belonging to Group III. Raju Rijal et al. showed in their series, faster rates of decrease in pirani score (improvement) treated by Ponseti technique, regardless of side, mean pirani scores improved much faster similar to our study.¹¹

NUMBER OF CASTS: In the present study the mean number of casts that were applied to obtain correction in group I, II and III were 4.66, 5.16 and 8.25 respectively. The more severe the initial deformity, the more casts were required to obtain correction. However overall mean number of cast for all groups was 7, which is quite similar to Laaveg and Ponseti and Herzenberg et al who reported mean number of cast as 7.

TENOTOMY: In our study, 94 (82%) feet required Percutaneous Tenotomy of tendo Achilles. Most important observation noted from this study is that a Pirani score of 2.5 and above require tenotomies. This conclusion reinforces the notion that even severe idiopathic clubfeet can be successfully treated using proper application of the Ponseti technique and the need for a tenotomy does not suggest a poorer result.

COMPLICATIONS: There were 2 complications among all the castings performed (abrasions and slippage of cast). 6 feet had abrasions and 4 feet had slippage of cast, constituting 8.6% of total feet. Lehman et al reported complications with rate of 10.2%.¹²

COMPLIANCE OF BRACING: Compliance with the foot abduction brace has also been an issue. Those patients compliant with foot abduction brace wear had 100% success at final last follow-up. Non-compliance of children with foot abduction bar & even with clubfoot splints or boot as well as low educational level of parents are important factors to predict relapse after the use of Ponseti method of CTEV management. We feel that counselling of parents is important to maintain regular follow up and prevent relapse.¹³ Thacker et al reiterated the fact that compliance with the foot abduction orthosis is essential for the success of the Ponseti technique.¹⁴

Final Results: In our study, overall 90% of the patients showed satisfactory results. John E Herzenberg, MD showed 88% good to excellent results and 3% recurrence in his series of 46 clubfoot treated by Ponseti Method.¹⁵ In the present study follow-up was of short duration, however we anticipate equal results in long term. Clearly, the true functional outcome of these patients cannot be determined until the child has completed growth, and perhaps not until later in life. Other important measures that could clarify our comparison includes the need for further treatments, the appearance and function of the feet at walking age, and the appearance and function during adulthood. Still, the results of treatment at the end of casting, using these validated scoring systems, allow an accurate assessment of the ability of casting and Achilles tenotomy to correct the clubfoot to a supple, plantigrade position. Ponseti technique for treatment of clubfoot is simple, effective, noninvasive, nonoperative and economical procedure.

CONCLUSION

Ponseti Method is an excellent conservative method for treatment of Congenital Talipes Equino Varus (CTEV) deformity. Treatment must be started at the earliest possible age. Number of casts required to achieve full correction increases as the age at presentation increases. The patients who have lower Pirani score at initial visit (i.e. less severe deformity) respond better and faster to the treatment as compared to those who have higher Pirani score at initial visit (i.e. more severe deformity). Strict adherence to the casting technique helps in successful correction and to minimize complications. Early results of treatment of Idiopathic CTEV by Ponseti technique results in good correction of the deformity with minimal surgery i.e. tenotomy of tendo Achilles. Maintenance of the corrected deformity with moulded orthosis is as important as deformity correction, parent motivation & compliance is very important for successful management of the deformity. Duration of the study is not sufficient to predict the long-term results but early results are certainly encouraging.

Conflict of interest: There is no conflict of interest

Funding source: NIL

GLOSSARY OF ABBREVIATIONS:

Abbreviation	Expansion
CTEV	Congenital talipes equinovarus
DB SPLINT	Dennis Browne Splint

REFERENCES

1) Cartlidge I. 1984. Observations on the epidemiology of club foot in Polynesian and Caucasian populations. Journal of medical genetics. Aug 1;21(4):290-2.

- 2) Chung CS, Nemechek RW, Larsen IJ, Ching GH. 1969. Genetic and epidemiological studies of clubfoot in Hawaii. *Human heredity*. 19(4):321-42.
- 3) Cowell HR, Wein BK. 1980. Genetic aspects of club foot. *JBJS*. Dec 1;62(8):1381-4.
- 4) Yamamoto H. 1979. A clinical, genetic and epidemiologic study of congenital club foot. *Japanese Journal of Human Genetics*. Mar 1;24(1):37-44.
- 5) Yang H, Chung CS, Nemechek RW, Rao DC. 1987. A genetic analysis of clubfoot in Hawaii. *Genetic epidemiology*. Jan 1;4(4):299-306.
- 6) Kite JH. 1964. *The Clubfoot*. Philadelphia: Grune & Stratton.
- 7) Wyne-Davies, Ruth. 1964. Talipes Equinovarus. A review of eighty four cases after completion of the treatment. *J Bone Joint Surg.*, 46-B: 464- 476.
- 8) Ponseti IV, Smoley EN. 1963. Congenital clubfoot: the results of treatment. *J Bone Joint Surg.*, 45A:261-275.
- 9) Changulani M, Garg NK, Rajagopal TS, Boss A, Nayagam SN, Sampath J, Bruce CE. 2006. Treatment of idiopathic clubfoot using the Ponseti method. *J Bone Joint Surg.*, (Br) 88B: 1385-138.
- 10) Turco VJ. 1981. Clubfoot, Churchill Livingstone, 1-84.
- 11) Rijal et al. Treatment of idiopathic clubfoot. *Ponseti vs Kite method Ind J Ortho.*, 2010; 44(2): 202-207.
- 12) Porecha M.M., & Chavda, H. 2009. Serial Corrective Cast manipulation in idiopathic clubfoot by Ponseti method (A study of 70 feet with 3 year follow up) *The Internet Journal of Orthopedic Surgery*. vol 11 number 2.
- 13) Dyer PJ, Davis N. 2006. The role of the Pirani scoring system in the management of clubfoot by the Ponseti method. *J Bone Joint Surg (Br)* 88B: 1082-1084.
- 14) Thacker MM, Scher DM, Sala DA, van Bosse HJP, Feldman DS, Lehman WB. 2005. Use of foot abduction orthosis following Ponseti casts. Is it essential? *J Pediatric Orthop.*, 25: 225-228.
- 15) Herzenberg JE, Carroll NC, Christofersen MR, Lee EH, White S, Munroe R. 1988. Clubfoot analysis with three-dimensional computer modeling. *J Pediatr Orthop.*, 8:257-62.
