



ORIGINAL ARTICLE

## Treatment of club foot with serial casting by ponsetti technique.

Hafiz Salman Saeed<sup>1</sup>, Basharat Manzoor<sup>2</sup>, M. Usman Sarwar<sup>3</sup>, Nusrat Rasheed<sup>4</sup>, Imran Manzoor<sup>5</sup>, Muhammad Omer Imran Elahi<sup>6</sup>

**Article Citation:** Saeed HS, Manzoor B, Sarwar MU, Rasheed N, Manzoor I, Elahi MOI. Treatment of club foot with serial casting by ponsetti technique. Professional Med J 2022; 29(6):802-806. <https://doi.org/10.29309/TPMJ/2022.29.06.6944>

**ABSTRACT... Objective:** To determine efficacy of serial casting of ponseti technique for treating club foot. **Study Design:** Cross Sectional study. **Setting:** Department of Orthopedics Surgery, Independent University Hospital, Faisalabad. **Period:** 1<sup>st</sup> July, 2019 to 30<sup>th</sup> June, 2020. **Material & Methods:** All clubfoot patients who presented to the Orthopedics department were included in the study. Patients were first classified using the Pirani scoring system, followed by manipulation and weekly above-knee casts. Equinus was assessed after 4th to 6th cast and percutaneous tenotomy was done if required. Follow-up of patients were kept for 5 months after final cast removal. All the data was entered and analyzed in SPSS Version 25. **Results:** Mean age of the patients was 37 weeks. From total 41 patients, 27 children presented between age of 0-6 months, 5 between 6 to 12 months and 9 between 1-2 years. Among the 41 children, 25 had unilateral while 16 had bilateral involvement. Among 41 children, 26 were male and 15 were females. Mean casts needed in our study was  $6.29 \pm 0.93$ . By using, the 10-point Pirani scoring system, the mean Pirani score was  $3.46 \pm 0.515$  at baseline while mean Pirani score after treatment was  $0.0317 \pm 0.130$ . The results were excellent in 82%, good in 12% and fair in 4%. **Conclusion:** Ponseti is reliable and effective method. Results of our study are good and satisfying and all clubfeet in our institution can be treated with this procedure.

**Key words:** Congenital Club Foot, Manipulation and Serial Casting, Ponseti Technique, Pirani Scoring System.

### INTRODUCTION

Clubfoot is a frequent congenital foot anomaly. It is also recognized as congenital talipes equinovarus (CTEV). The condition exists from birth. Approximately 1000 live births are effected from it.<sup>1</sup> More than 2000 years ago, clubfoot deformity was first defined by Hippocrates.<sup>2</sup> Myelodysplasia, arthrogryposis, or a combination of congenital anomalies can all produce clubfoot deformity. But, it is most often an idiopathic birth defect that occurs independently.<sup>3</sup> A normally developing foot evolves into a clubfoot during the second trimester of pregnancy. Turco explains the pathophysiology as the underlying calcaneus and navicular driving the talus in equinus, with the talus's head and neck moved medially. Under the talus, the calcaneus is inverted, with the posterior end pushed upward and laterally and the anterior end shifted downward and medially.<sup>4</sup> Clubfoot remains as an unresolved clinical challenge for orthopaedic surgeons. Due

to late presentation, a higher chance of treatment cessation, and superstitious beliefs connected with this congenital illness, the problem is particularly serious in developing countries.<sup>5</sup> There is a lot of information in the literature about numerous treatment options range from bandages and plaster casts to surgical treatment, but no single modality has achieved the ultimate goal of treatment. Nonsurgical treatment often resulted in minimal improvement, but children with idiopathic clubfoot who received surgery frequently suffered severe soft tissue scarring and chronic pain. However, those who adopt the Ponseti method of serial manipulation and casting have generally ignored these remarks.<sup>6</sup> Ponseti has gained widespread acceptance as a result of its superior results from a variety of manipulation techniques.<sup>7</sup>

The Ponseti approach drastically reduced the number of idiopathic clubfoot procedures.

1. MBBS, FCPS (Orth), FRCS (Glasgow), FACS (USA), Associate Professor Orthopedic, Independent Medical College, Faisalabad.  
2. MBBS, MS (Orth), Assistant Professor Orthopedic, FMU Faisalabad.  
3. MBBS, FCPS (Orth), Assistant Professor Orthopedic, Shalamar Medical & Dental College, Lahore.  
4. MBBS, FCPS Associate Professor Orthopedic Surgery, Dow International Medical College, Dow University of Health, Karachi.  
5. MBBS, FCPS, Assistant Professor Orthopedic, Shalamar Medical & Dental College, Lahore.  
6. 4<sup>th</sup> Year MBBS Student, United Medical & Dental College. Karachi.

**Correspondence Address:**  
Dr. Hafiz Salman Saeed  
Department of Orthopedic  
Independent Medical College, Faisalabad.  
hafizsalman167@gmail.com

**Article received on:** 18/12/2021  
**Accepted for publication:** 22/02/2022

As a result of this performance, the approach has gained worldwide acceptance.<sup>8</sup> Now, closed management like serial casting is gold standard for treatment of clubfoot. Excellent results are reported in long-term studies by Ponseti manipulation method and serial casting. When compared to surgical release, this approach demonstrated a greater degree of motion and push-off strength.<sup>9</sup> The aim of current study is determine the efficacy of serial casting of ponseti technique for treating club foot.

## MATERIAL & METHODS

This cross sectional Study was conducted at Department of Orthopedics Surgery Independent University Hospital, Faisalabad. The duration of study was 12 months from 1<sup>st</sup> July, 2019 to 30<sup>th</sup> June, 2020. All the patients of clubfoot presenting to the Orthopedics department during the study duration were the sample size of the study.

### Inclusion Criteria

All patients of either age, age below two years having clubfoot (both uni or bilateral).

### Exclusion Criteria

- Age > 2years,
- Previous treatment with other plaster cast technique
- Prior surgery for clubfoot,
- Patients having other continental defect/ illness
- Secondary or atypical clubfoot

### Data Collection Procedure

After approval of the study from Ethical Review Committee, all patients of club foot deformity in out-patients Orthopedics Surgery Department of Independent University Hospital, Faisalabad were included in this study. Consent was taken from the parents. History and clinical picture of all patients were taken and they were subjected to complete general examination. Mobility of foot was assessed after taking history. Pirani scoring system was used to classify a patient that was followed by manipulation and weekly above-knee castings. Equinus was assessed after 4th to 6th cast and percutaneous tenotomy was done if required. Progress of Patient's was examined

weekly with the help of Pirani scoring system. At final removal of cast, final outcome was noted. After that, the feet were kept in foot abduction brace. For the first 3 months, parents were guided to retain the feet in brace for 23 hours in a day and then for 12 to 14 hours during the night and napes. Follow-up of patients were kept for 5 months after removal of last cast. All the data was entered and analyzed in SPSS Version 25. Quantitative data was displayed as mean  $\pm$  S.D. Qualitative data was presented as frequency and percentages. Chi-square test was used and P-value less than 0.05 was considered as significant.

## RESULTS

In current study, 41 children were treated with clubfoot by Ponseti method of serial casting. Mean age of patients was 37 weeks. From total 41 patients, 27 children presented between age of 0-6 months, 5 between 6 to 12 months and 9 between 1- 2 years. Among the 41 children, 25 had unilateral while 16 had bilateral involvement. Among 41 children, 26 were male and 15 were females. Twenty seven (65.85%) patients belonged to lower, 11 (26.58%) middle and only 3 (7.31%) belonged to upper socio-economic class. All the babies were full term. Twenty seven (65.85%) patients were born through spontaneous vaginal delivery, 9 (21.95%) required caesarean section and 5 (12.19%) required episiotomy to facilitate their births.

Mean casts required in this study was  $6.29 \pm 0.93$ . Mean Pirani score was  $3.46 \pm 0.515$  at baseline while mean Pirani score after treatment was  $0.0317 \pm 0.130$ . Overall mean pirani score was  $3.4283 \pm 0.60$ . There was an association between the initial Pirani score and number of casts required for the correction. Increase numbers of casts were required at increased score. There was no need for substantial soft tissue release on any of the feet. There was relapse of deformity in 6 feet. 3 of them were re-plastered and Achilles tenotomy. 2 patients underwent lateralization of tibial. The results were excellent in 82%, good in 12% and fair in 4%.

Total Number of Patients	Frequency (%)
<b>Gender</b>	
Male	26
Female	15
<b>Socioeconomic Status</b>	
Low	27 (65.85%)
Middle	11 (26.58%)
High	3 (7.31%)
<b>Family History of Clubfoot</b>	
Yes	7 (17.03%)
No	34 (82.97%)
<b>Mode of Delivery</b>	
Vaginal	27 (65.85%)
C-Section	9 (21.95%)
Episiotomy	5 (12.19%)
<b>Side</b>	
Bilateral	16 (39.02%)
Right	9 (21.95%)
Left	16 (39.02%)

**Table-I. Clinical-Socio-demographic features of patients (n=41).**

	Mean	Standard Deviation	P-Value
Baseline Pirani Score	3.46	0.515	0.000
Final Pirani Score	0.0317	0.130	
Mean Pirani Score	3.4283	0.60	

**Table-II. Pirani score of the patients**

Outcome	Number of Foot	Percentage
Excellent	34	82.92
Good	5	12.19
Fair	2	4.87

**Table-III. Final outcome of the pinsoti technique**

**DISCUSSION**

Clubfoot is a complicated foot problem that needs a significant amount of time and effort. Severe clubfoot treatment has been a challenge continuously. Clubfoot treatment was changed drastically by start of Ponseti method. Despite of safety and cost-effectiveness of this method, clubfoot is still widespread globally.<sup>10</sup> Manipulation and serial casting is optimal technique nowadays for clubfoot.<sup>11</sup> For improving management of club foot, current prospective randomized control study conducted in the orthopedic outpatient clinic of Independent University Hospital Faisalabad which is tertiary care hospital providing services to large number of patients

to residents of Faisalabad as well as the nearby districts. In current study 41 children were treated with clubfoot by Ponseti method of serial casting. Mean age of the patients was 1-56 weeks. From total 41 patients, 27 children presented between age of 0-6 months, 5 between 6 to 12 months and 9 between 1- 2 years. Among 41 children, 26(63.41%) were male and 15(36.58%) were females. Several other studies have reported also dominance of male patients as compared to females. In a study by Avinash et al, from total 37 children, 29(78%) were male and 8(21%) were females.<sup>12</sup> In another study by Fahmi et al, the percentage of male was 58.3% and female was 41.7%.<sup>13</sup> A study from Hyderabad Sindh also reported similar results where from total study participants, 61.3% were males and 38.7% were females.<sup>14</sup> From total 41 patients of our study, twenty seven (65.85%) patients belonged to lower, 11 (26.58%) middle and only 3 (7.31%) belonged to upper socio-economic class. All the babies were full term. Twenty seven (65.85%) patients were born through vaginal delivery, 9 (21.95%) with caesarean section and 5 (12.19%) need episiotomy to assist birth. Similar results are reported in a study from Lahore, Pakistan.<sup>15</sup>

Club foot deformity might be uni or bilateral. In 1983, Cartlidge I detected that bilateral club foot was slightly less common than unilateral. Among the 41 children, 16 had bilateral involvement and 25 had unilateral from which 21.95% had right and 39.02% had left deformity. In a series of 70 patients with club foot deformity from KPK, Hussain SA in 2008 reported 23 (32.8%) patients had bilateral and 47 (67.2%) had unilateral club foot deformity.<sup>16</sup> In a study by Fahmi et al, from 49 patients, bilateral involvement was present in 18 (36.73%) and 31 (63.27%) had unilateral involvement, right foot involvement was involved in 17 (54.84%) and 14 (45.16%) having left foot involvement.<sup>13</sup> Mean casts needed in our study was 6.29±0.93 which was analogous when compared with studies. Our results are comparable to other studies. In a study Hallaj et al, the average number of casts was 5.7 times. It was greater than Panjavi et al.'s study, which used general anesthesia for casting.<sup>17</sup> Severe cases might result in more casting in our study

compared to other studies. By using, the 10- point Pirani scoring system, the mean Pirani score was  $3.46 \pm 0.515$  at baseline while mean Pirani score after treatment was  $0.0317 \pm 0.130$ . Overall mean pirani score was  $3.4283 \pm 0.60$ . Similar findings were reported in other studies as well.<sup>12</sup>

The final outcome results of our study showed that outcome was excellent in 82%, good in 12.19% and fair in 4.87%. Our results are comparable to other studies. Fahmi et al reported that at the end of treatment, 13 feet had favorable outcome, 8 cases (53.3%) excellent and 5 cases (33.3%) good and 2 feet had fair outcome (13.3%).<sup>13</sup> Avinash et al have also reported similar results in which results were excellent in 45 (88.3%) and good in 6 (11.7%).<sup>12</sup>

## CONCLUSION

For treatment of club foot, Ponseti is reliable and effective method. It reduced the need for traditional extensive surgeries profoundly. Results of our study are good and satisfactory and all club foot patients in our institution can be treated by this technique. This technique is a very easy, safe and result-oriented for clubfoot management in remote areas of a developing country like Pakistan. Appropriate motivation and persuasion of parents for brace treatment can help to sustain the correction for a longer period and to prevent relapse.


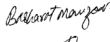

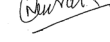

Copyright© 22 Feb, 2022.

## REFERENCES

1. Famude S, Adewole O, Komolafe O. **Achievement of developmental milestones in children with idiopathic clubfoot treated with Ponseti method in Lagos Nigeria.** African Journal of Physiotherapy and Rehabilitation Sciences. 2016; 8(1-2):44-6.
2. Hernigou P. **History of clubfoot treatment; part III (twentieth century): Back to the future.** International orthopaedics. 2017; 41(11):2407-14.
3. Chang CH, Wang SM, Kuo KN. **The Ponseti method decreased the surgical incidence in children with congenital clubfoot: A population-based, 8 birth-year cohort study.** JBJS. 2019; 101(21):1955-60.
4. Basit S, Khoshhal KI. **Genetics of clubfoot; recent progress and future perspectives.** European Journal of Medical Genetics. 2018; 61(2):107-13.
5. Inamullah SK, Joya RA, Shafiq M, Khan Y, Ali W, Azhar S, Jatoi FS. **Outcome of ctev with ponseti cast.** Turkish Journal of Physiotherapy and Rehabilitation.;32:3.
6. Pulak S, Swamy M. **Treatment of idiopathic clubfoot by ponseti technique of manipulation and serial plaster casting and its critical evaluation.** Ethiopian journal of health sciences. 2012; 22(2): 77-84.
7. Vishnu M, Mathew J, Karuppall R, Prasad A. **Relapse pattern in club foot treated with ponseti technique-a prospective observational study from Kerala, India.** 2021.
8. Walter C, Sachsenmaier S, Wünschel M, Teufel M, Götze M. **Clubfoot treatment with ponseti method—parental distress during plaster casting.** Journal of Orthopaedic Surgery and Research. 2020; 15(1):1-9.
9. Hallaj-Moghaddam M, Moradi A, Ebrahimzadeh MH, Habibzadeh Shojaie SR. **Ponseti casting for severe club foot deformity: Are clinical outcomes promising?** Advances in orthopedics. 2015; 2015.
10. Johnson RR, Friedman JM, Becker AM, Spiegel DA. **The Ponseti method for clubfoot treatment in low and middle-income countries: A systematic review of barriers and solutions to service delivery.** Journal of Pediatric Orthopaedics. 2017; 37(2):e134-e9.
11. Eusebio IDD, Sumpaico CEJ. **Results of ponseti casting for clubfoot in a Tertiary Public Hospital.** Acta Medica Philippina. 2021; 55(3).
12. Gundavarapu A, Singh V, Mishra PK. **Correction of clubfoot by ponseti method-Our experience.** International Journal of Orthopaedics. 2021; 7(1):04-9.
13. Alghazawi FS, Salem AAA, Abdelrahman KE, Thabet MEE. **Evaluation of percutaneous needle tendoachilles tenotomy as an outpatient procedure in clubfoot treatment by ponseti method.** Annals of the Romanian Society for Cell Biology. 2021; 25(6):13403–10–10.
14. Khan SM, SM K. **Ponseti treatment for idiopathic clubfoot deformity-Role of secondary care hospitals.** J Pak Med Assoc. 2016; 66:111-4.
15. Sami AL, Hanif A, Masood F, Awais SM. **Cross sectional study of club foot at tertiary care hospital.** Annals of King Edward Medical University. 2010; 16(1):20-.
16. Hussain SA, Khan MS, Ali MA. **Modified Turco's postero-medial release for congenital talipes equinovarus.** Journal of Ayub Medical College, Abbottabad: JAMC. 2008; 20(3):78-80.

17. Panjavi B, Sharafatvaziri A, Zargarbashi RH, Mehrpour S.  
**Use of the ponseti method in the Iranian population.**  
 Journal of Pediatric Orthopaedics. 2012; 32(3):e11-e4.

### AUTHORSHIP AND CONTRIBUTION DECLARATION

No.	Author(s) Full Name	Contribution to the paper	Author(s) Signature
1	Hafiz Salman Saeed	Proof reading, Data Collection.	
2	Basharat Manzoor	Data collection.	
3	M. Usman Sarwar	Data Analysis.	
4	Nusrat Rasheed	Literature search.	
5	Imran Manzoor	Statistics	
6	M. Omer Imran Elahi	IRB Approval.	