

Role of Multiple Serial Casting beyond Standard Casting Technique in Managing Club Feet

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ABSTRACT

Aim: To find the role of multiple serial casting beyond standard casting technique in managing club feet.

Methodology: Cohort prospective study. Department of Orthopaedic, Chandka Medical College Hospital Larkana from July 1, 2021 to June 30, 2022. One hundred cases were enrolled. The Pirani scoring system was applied for detailed monitoring of the severity and treatment of clubfoot, and the Ponseti method technique was performed. Foot or feet were cast and fastened in an abduction brace at 95% of the correction rate being achieved. All children below two years of age who had one or both feet clubbed were included in this study.

Results: The majority of the children visiting the hospital setting for treatment of clubfoot were within the age group of 0–5 months, followed by 6–12 months in 55% and 31% of the children, respectively. About 70% of the children with club feet were boys, with only 30% being girls. The baseline Pirani score was 3.47 ± 0.523 , while it decreased significantly to 0.0321 ± 0.135 as the final Pirani score. The outcomes of the study showed that 68% of the children had excellent treatment, 10% had really good treatment, and 18% had fair treatment.

Conclusion: Serial casting is a favourable technique for the treatment of clubfoot, wherein it assists in the maintenance of foot balance and proper development.

Keywords: Multiple serial casting, Standard casting, Club feet

INTRODUCTION

There are various musculoskeletal abnormalities presented in childhood. The childhood musculoskeletal anomalies varied from the adult abnormalities in different ways. These include anatomical as well as physiological and psychological changes. The adult-related effect is presented in the form of different radiologists and clinics. In paediatric cases of musculoskeletal disorders, the majority of the children have hip, bone, or soft tissue deformities, as well as inflammatory ailments¹.

Congenital talipes equinovarus (CTEV), which is commonly known as club foot, is one of the musculoskeletal abnormalities prevalent as a congenital defect. It is categorised by the out-of-position or twisted foot, mostly as a congenital presentation. The tendons joining the bone are shorter than normal in cases of clubfoot¹. It is considered a birth defect and requires immediate medical support; otherwise, it causes a lifelong deformity. Forefoot adduction is present in one of the 1000 births globally². However, the incidence of the presentation is much higher in developing countries^{3,4}.

Within the previous years, there have been two major methods applied for the treatment of the clubfoot or foot. The initial method consists of conception adaptation followed by strapping and serial-plaster treatments, whereas in the other method, various surgical processes are adapted for the correction of the clubfoot. The Ponseti method has proven its efficiency in painless morphological treatment^{4,5}.

The severity of the disease can vary from case to case. There is an equal risk of neonates having clubfoot, either in one foot or both. The gold standard treatment for the clubfoot, specifically idiopathic clubfoot, is conservative^{7,8}. Applying the Ponseti protocol which includes deformity reduction through a series of weekly plasters and castings in addition to the Achilles tenotomy. It is not alarming to know that parents of children suffering from chronic ailments suffer from mental anxiety and stress. Various research has focused on understanding the role of casting and clubfoot treatment in reducing the stress of parents in this context⁹⁻¹².

The present study was conducted to analyse the efficiency of serial casting beyond standard casting methods for the treatment management of clubfoot. The results of this study would lead to a better understanding and the adoption of a technique that can assist in the most appropriate treatment methods for children suffering from clubfoot.

MATERIALS AND METHODS

This cohort prospective study was conducted at the Department of Orthopaedic Unit-1, Chandka Medical College Hospital Larkana, from July 1, 2021, to June 30, 2022. All children's parents were contacted for informed consent before participation in the study. This study was performed by a skilled orthopaedic surgeon consultant who specialised in paediatric surgery. A total of 100 cases were enrolled. The sample size was calculated through the available sample size calculator software, where the margin of error was taken as 5% at a 95% confidence interval and the power of the test as 80%. All clinical assessments of each child were completed for diagnostic purposes. All children below two years of age who had one or both feet clubbed were included in this study. The Pirani scoring system was applied for detailed monitoring of the severity and treatment of clubfoot. Any child born with a spinal deformity, a secondary or atypical clubfoot, prior clubfoot surgery, or any other musculoskeletal disorder than clubfoot was excluded from this research. Children from both genders were included. After mobility analysis and the complete diagnosis of the patients, the treatment plan was applied. The Ponseti method technique was performed. Before each casting manipulation, stretching of ligaments and joint capsule tendons by putting on and off pressure of the thumb at the talar head through tracing from the lateral malleolus was performed. This was done by using another thumb and index finger fixed to the big toe flub foot. Foot or feet were cast and fastened in an abduction brace at 95% of the correction rate being achieved. For this purpose, Equinus was evaluated subsequently from fourth to sixth cast. The percutaneous casting was reapplied as per the requirements. At the time of final casting removal, each child was assessed for casting outcomes. Foot were further held on the abduction brace for almost 23 hours per day for up to three months, which was also preceded by 12–14 hours per day in later months and until the removal of the cast was required.

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All the related variable information was entered in a well-structured questionnaire. The children were followed for up to 5 months during their treatment. The data was analysed using SPSS version 26.0, wherein the chi-square test was applied for the analysis. A P value less than 0.05 was taken as significant.

RESULTS

The majority of the children visiting the hospital setting for treatment of clubfoot were within the age group of 0–5 months, followed by 6–12 months in 55% and 31% of the children, respectively. About 70% of the children with club feet were boys, with only 30% being girls (Table 1).

The right foot involvement was slightly higher than that of the left foot involvement in cases where only one foot was involved, while half of the cases reported had both feet involved. The family history of clubfoot was observed in 18% of the cases (Table 2).

The baseline Pirani score was 3.47 ± 0.523 , while it decreased significantly to 0.0321 ± 0.135 as the final Pirani score. The mean score was therefore determined to be 3.45 ± 0.61 (Table 3). The outcomes of the study showed that 68% of the children had excellent treatment, 10% had really good treatment, and 18% had fair treatment. There were cases that had a poor outcome of the study due to non-cooperative attitudes, including loose casting, leg swelling, and poor treatment (Fig. 1).

Table 1: Distribution of age and gender within children suffering from club foot/feet (n=100)

Variable	No.	%
Age (Months)		
0-5	55	55.0
6-12	31	31.0
13-18	11	11.0
19-24	3	3.0
Gender		
Male	70	70.0
Female	30	30.0

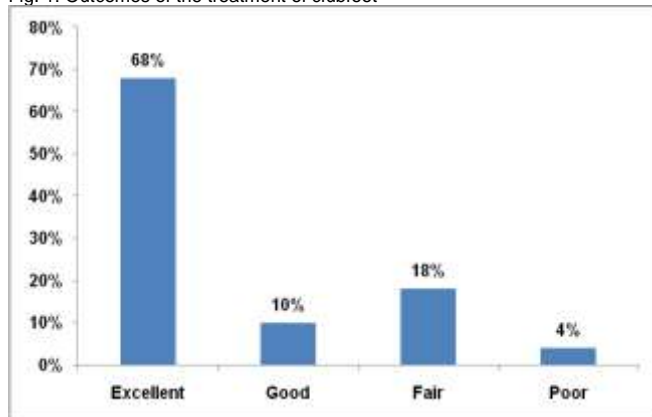
Table 2: Frequency of club foot/feet and family history (n=100)

Variable	No.	%
Foot involved		
Left	22	22.0
Right	28	28.0
Both	50	50.0
Familial History		
Yes	18	18.0
No	82	82.0

Table 3: Mean baseline and final Pirani Score in Club foot/feet children

Pirani Score	Mean±SD	P value
Baseline	3.47 ± 0.523	<0.05
Final	0.0321 ± 0.135	

Fig. 1: Outcomes of the treatment of clubfoot



DISCUSSION

Recent advancement in technologies has led to an increase in the early detection methods of clubfoot in increased populace countries, bringing an improvement in health screening modalities awareness among parents. There should be a complete awareness of the social implications related to the term neglected clubfoot, which has different meanings in cultural aspects. It can result in poor outcomes from the treatment as well as delayed developmental goals^{13,14}.

Shah et al¹⁵ stated that neglect in clubfoot results in a negative connotation, which implies a careless attitude in the administration of casting. In developing countries where there are fewer health facilities, the chances of late casting and treatment of clubfoot are more frequent. This leads to a decrease in the efficiency of treatment¹⁶⁻¹⁸.

The period of extension of casting is important for increasing the excellence of treatment, as mentioned in the previous research as well¹⁹. The researchers have also reported the fact that there are more boys suffering from clubfoot than girls, as also reported in this study²⁰.

Club foot deformity may have two forms, i.e., unilateral and bilateral. The unilateral club foot is slightly more common than the bilateral club foot^{21,22}. In the present study, 16 out of 41 children had bilateral clubfoots, whereas 25 of them had unilateral deformities. Similar results were reported by Hussain et al²¹ and Westhoff et al²². The mean cast needed in the present study was 6.29 ± 0.93 . Similarly, other studies have also reported that the average number of casts was six times higher even after using general anaesthesia²³. The present study also demonstrated that the mean baseline and after-treatment Pirani scores were 3.4283 ± 0.60 , 3.46 ± 0.515 , and 0.0317 ± 0.130 . A similar result has been documented elsewhere²³. The final outcome of the present study showed that 82% of the cases showed excellent outcomes. Similarly, 12% and 4.8% showed a good and fair outcome. This result is also comparable with other findings²⁴.

The present study highlights that casting in low-income countries could be the commonest congenital orthopaedic deformity in Pakistan. Larkana district showed a higher number of clubfoot children, which sometimes leads to the prolongation of the casting process. Hot climatic conditions, ignorance, and electricity problems further delay the process. The cooperation of the parents and guardians is also required to minimise the duration of the casting procedure in order to achieve a better outcome²⁵.

CONCLUSION

Serial casting is a favourable technique for the treatment of clubfoot, wherein it assists in the maintenance of foot balance and proper development. There are equal chances of single or both feet being involved in the deformation, with gender bias being a prominent factor involved.

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1. Conception and design of or acquisition of data or analysis and interpretation of data.
2. Drafting the manuscript or revising it critically for important intellectual content.
3. Final approval of the version for publication.

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