

Comparative Analysis of results between Conventional and Accelerated Ponseti Technique for idiopathic congenital clubfoot

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Abstract

Background: Ponseti method is a well-accepted treatment modality for children with clubfoot deformity. Accelerated frequency of cast changes in Ponseti method may limit the time spent in casts during the corrective phase of treatment without any effect on the final result. We conducted this study to compare the results of accelerated and the conventional Ponseti Method.

Method: A prospective experimental randomized controlled trial was conducted from July 2014 to June 2015. Forty cases with 53 clubfeet were taken up for the study. Half the cases were given biweekly plaster in the accelerated group and the other half weekly casts as per the conventional Ponseti method. All feet were scored using the Pirani method. Successful correction was labeled as Pirani Score ≤ 1 . Failure was labeled as Pirani Score >1 even after 8 corrective casts. The 'treatment time in plaster' refers to the number of days in plaster prior to a tenotomy.

Results: There were no significant difference in the final Pirani score of the two groups. There were no episodes of recurrence at six months. The average duration of treatment in the accelerated group was 15 days whereas in the conventional method was 35 days.

Conclusion: The results of this study support accelerated frequency of cast changes in Ponseti technique. In developing countries where travelling to clinics necessitates time away from home, work, and family, the adoption of 'accelerated casts' can reduce the duration of treatment and perhaps help to improve compliance and overall outcomes.

Key words: Accelerated Ponseti, clubfoot, Pirani

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Introduction

The incidence of congenital talipes equinovarus (clubfoot) ranges from 1-3 per 1000 live births across the world. [1] Ponseti method has transformed the management of clubfoot in children producing good long-term results and in the last two decades has

gained acceptance in the worldwide orthopaedic community.[2- 5]

The Conventional Ponseti method uses serial application of weekly above knee plaster casts to gradually correct the deformity, using a strictly defined sequence of molded plaster changes. The last deformity to be corrected is equines, which often requires a percutaneous tendo

Achilles tenotomy followed by a final plaster. This final plaster is removed after three weeks and foot abduction braces are given to the child which are to be worn for twenty three hours per day for three months and thereafter for twelve hours at night, till the age of three years.

We run a clubfoot clinic at our hospital. The patients who come to our clinic often have to travel long distances for treatment. Transport facilities for these patients are often erratic and not always available. In addition, keeping a plaster clean and dry for a week can be challenging and failure to do so may result in a loss of position.

There is now strong evidence to suggest that accelerated frequency of cast changes has comparable outcomes to those of the conventional Ponseti method with the benefit of limiting the time spent in casts during the corrective phase of treatment. The researchers have modified the frequency of casting from weekly basis to as less as thrice a week and produced comparable results [6-8]. There is still very little published data about effectiveness of accelerated Ponseti technique in the Indian patients.

We conducted this study to determine the feasibility and compare the results of accelerated and conventional Ponseti technique in idiopathic congenital clubfoot.

Methods

A prospective experimental randomized controlled trial was conducted from July 2014 to June 2015 in the clubfoot clinic at our tertiary care center. Forty cases with 53 clubfeet were taken up for the study. The International Guidelines for Biomedical Research involving Human Subjects issued by CIOMS, (Geneva 1982) were complied.

The Inclusion Criteria were; age less than three months, unilateral or bilateral idiopathic clubfoot and willingness to take

part in the study while the Exclusion Criteria were; age more than three months, earlier treated with other methods of

plaster cast application, earlier operated for clubfoot, concomitant major illness, atypical or secondary clubfoot and unwillingness to take part in the study.

All the patients who fulfilled the inclusion criteria were registered in the clubfoot clinic for the study. Randomization was done using computer table and patients were allocated to one of the treatment groups either conventional or accelerated Ponseti casting. All feet were scored using the Pirani method [9], recorded by an independent assessor at each visit. Successful correction was labeled as Pirani Score ≤ 1 . Failure was labeled as Pirani Score > 1 even after 8 corrective casts. A percutaneous tendo achilles tenotomy was performed if dorsiflexion was $< 10^\circ$ at the end of manipulation and plastering. Both groups were put into plaster, following tenotomy, for three weeks. The defined endpoint of treatment for both groups, labeled 'treatment time in plaster' refers to the number of days in plaster prior to a tenotomy.

Both groups were given abduction braces to wear in accordance with the standard Ponseti program. All patients were treated as outpatients, thereby reducing any bias from altered compliance and enabling us to directly compare the efficacy of the two methods in terms of correction of the deformity. Follow-up was done at monthly intervals for six months.

We used Mann-Whitney U test to compare the data between the two groups, p-value < 0.05 was considered statistically significant.

Results

A total of 40 children (53 feet) with idiopathic clubfoot were recruited into the trial, 13 of whom were bilateral. Half the patients i.e. 20 children (27 feet) were allocated to the

accelerated Ponseti group and the other half (26 feet) to the conventional treatment group. The two groups were demographically similar to each other (Table 1). The mean age of the children was 23.54 ± 11.54 days in the accelerated group and 22.95 ± 11.12 days in the conventional group.

There was no significant difference in the Pirani score of the groups, both before and after treatment (Table 2). Of the 40 patients, two were 'not corrected' (Pirani score > 1.0), one from the accelerated group and the other from the control group and they required a surgical procedure to achieve correction.

Variables	Conventional	Accelerated
Number of	20	20

Follow-up in the accelerated group was for a mean of 233 days (70 to 348) and in the control group for a mean of 248 (25 to 346). There were no episodes of recurrence at six months. No complications due to casting were noted in any of the group.

Discussion

Over the last decade Ponseti method has become the standard method of treating children with clubfoot deformities.[2,3] Various authors have published reports of up to 98% success with this technique.[4,10,11] The Ponseti technique has shown good results in non idiopathic as well as syndromic clubfeet .[12] It has also shown relatively good results in older children who present late for treatment .[13] Even in post-surgical patients who have residual deformity Ponseti technique has shown good results.[14]

Our results suggests that comparable results can be achieved with an accelerated method, changing the plaster two times per week. Morcuende et al [6] undertook a non-randomized retrospective study of 230 patients (319 clubfeet) over an 11- year period. Patients were assigned to a five- or

Mean age of	22.95 ± 11.12	$23.54 \pm 11.54^*$
Number of	8	12
Bilateral	6	7
Number of	26	27
Number of	20	20
Cases in	1	1
No of feet	25	26

*Not Significant

Table 1: Demographic characteristic of patients enrolled for study in two groups.

Variabl	Convention	Accelerat	p-
Mean	5.32 ± 0.55	5.21 ± 0.37	N.S.
Mean	0.4 ± 0.43	0.23 ± 0.35	N.S.
Mean	4.92 ± 0.77	4.98 ± 0.49	N.S.
Mean	5.08 ± 0.91	4.15 ± 0.61	N.S.
Mean	35.24 ± 5.84	14.19 ± 2.2	<0.00

Table 2: Comparison between conventional and the accelerated Ponseti technique

seven-day frequency of plaster changes based solely on geography. The authors found that an accelerated five-day interval can be equally effective. They were concerned that further acceleration in the casting might give rise to problems like swelling in the cast.

Harnett et al [7] further accelerated the regimen to three times a week and got comparable results .They did not come across any problems which Morcuende et al [6] had suggested with faster regimens. Our final results were similar to the results published by Harnett et al.

There are many factors that have contributed to the research in decreasing interval between cast application as part of the Ponseti clubfoot correction. Firstly, there is now good evidence to support that shortening cast time for the idiopathic congenital clubfoot deformity gives equally good results.[6-8,15]

Secondly, there is lot of inconvenience to the patients and their family, who often have to travel long distances over a period of two to three months, to distant clinics for treatment. The time away from home, loss

of working hours, economic burden on family all of which are a common concern in developing countries, may be greatly improved if the duration of treatment is cut short. [6-18] This could provide great savings for costs incurred whilst living away from home, and time lost from work. In turn, compliance may also benefit. The patients who come from remote areas can be admitted for this period and upon application of the last cast after tenotomy can be discharged with a foot abduction brace. They can be instructed to remove the cast after three weeks and continue the treatment with braces thereafter.

Thirdly, less time immobilized in plaster is probably advantageous for the baby in terms of reduced skin sore issues, easier bathing, more normal motor development and possibly lessens the risk of osteopenia.[19] It is important to appreciate that all accelerated casting studies and trials have addressed the idiopathic congenital clubfoot, and that the effects and use in syndromic [20] or complex clubfoot types [21] are unknown.

Some of the limitations of this study include the relatively small sample size, and the short period for data collection. The study also did not have a long follow up to show whether there is more recurrence in the accelerated Ponseti group or not.

Conclusion

The Ponseti method continues to be the best approach to correct children with congenital clubfoot. The results of this study support accelerated frequency of cast changes in Ponseti technique . The rescheduling of the weekly clubfoot clinic for casting, to at least twice a week , may be a possible trend in the near future. In developing countries where travelling to clinics necessitates time away from home, work, and family, the adoption of 'accelerated

casts' can reduce the duration of treatment and perhaps help to improve compliance and overall outcomes.

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