

Evaluation of the efficacy and functional outcome between standard Ponseti and accelerated Ponseti in the management of CTEV: a comparative study

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Received: 15-11-2020 / Revised: 30-12-2020 / Accepted: 21-01-2021

Abstract

Aim: The aim of the study to analyze the efficacy and functional outcome between standard Ponseti and accelerated Ponseti in the management of CTEV. **Material and methods:** This was an analytical cross sectional study conducted in the Department of Orthopaedics Madhubani Medical College and Hospital, Madhubani, Bihar, India from August 2019 to January 2020, after taking the approval of the protocol review committee and institutional ethics committee. A total of 100 children (120 feet) were treated. Among these 100 children, 50 children (60 feet) were treated by standard Ponseti method and 50 children (60 feet) were treated by accelerated Ponseti method. **Results:** In the standard Ponseti group, 8 children had bilateral clubfoot, 17 were unilateral on left side, and 17 were unilateral on right side. Among 50 children, 33 (66%) were male and 17 (34%) were female. Mean age at presentation was 25.3 days. The mean Pirani score at presentation was 4.60. The mean number of days the child was in cast was 53.4. Eight cases (16%) had a relapse. Mean Pirani score at 3 months follow-up was 0.11. In the accelerated Ponseti group, 10 children had bilateral clubfoot, 15 were unilateral on left side, and 15 were unilateral on right side. Among 50 children, 27 (54%) were male and 23 (46%) were female. Mean age at presentation was 27.5 days. Mean Pirani score at presentation was 4.71. The mean number of days the child was in cast was 40.12. Mean Pirani score at 3 months follow-up was 0.13. **Conclusion:** In our study, idiopathic clubfoot was seen more common in male child than female child and concluded that accelerated Ponseti method is as effective as standard Ponseti method in the treatment of idiopathic CTEV.

Keyword: Accelerated ponseti method, Idiopathic clubfoot, Standard ponseti.

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Introduction

Congenital clubfoot, or congenital talipes equino varus (CTEV), is one of the most common congenital deformities[1]. It most likely represents congenital dysplasia of all musculoskeletal tissues (musculotendinous, ligamentous, osteoarticular, and neurovascular structures) distal to the knee. This conclusion is based on multiple investigators' observations of a myriad of different abnormal anatomic findings and on the functional outcome of patients who were believed to have received optimal non-operative or operative treatment but nevertheless subsequently always had some degree of impairment[2]. Congenital clubfoot is a complex three-dimensional deformity consisting of four components: cavus, adductus, varus, and equinus. The incidence of congenital clubfoot is approximately 1.2 per 1,000 live births[3]. If a clubfoot is allowed to remain deformed, many other late adaptive changes occur in the bones. These changes depend on the severity of soft-tissue contractures and the effects of walking. In untreated adults, some joints may spontaneously fuse or degenerative changes secondary to the contractures may develop. On the basis of a proper understanding of the pathoanatomy from stillborn fetuses with clubfeet and of functional anatomy from radiography of normal feet and of clubfeet, Ignacio Ponseti developed and refined a uniform treatment for clubfeet in the late 1940s[4]. Although Ponseti's clubfoot treatment has been around for many years, it is only in the recent past that his method has been

given due consideration with a review of the long-term results of patients treated by him[5]. The standard regimen of the Ponseti casting technique involves weekly change of cast after an initial period of manipulation. However, more recently, this arbitrary interval between two consecutive casts has been called into question. Studies have shown that the accelerated Ponseti protocol has as similar safety and efficacy as the standard protocol. In the accelerated Ponseti technique, casting is done after five days, twice weekly or thrice weekly[6]. An earlier study by Elgohary and Abulsaad⁷ showed that the accelerated Ponseti technique significantly reduces the correction time without affecting the final results while being as safe and effective as the traditional Ponseti, but they had excluded patients with a pre treatment Pirani score of less than 4. A decrease in the overall duration of treatment could offer multiple potential benefits leading to better compliance. The aim of the study to analyze the efficacy of accelerated Ponseti method in the management of CTEV and to compare the functional outcome between Ponseti and accelerated Ponseti in the management of CTEV.

Material and methods

This was an analytical cross sectional study conducted in the Department of Orthopaedics Madhubani Medical College and Hospital, Madhubani, Bihar, India from August 2019 to January 2020, after taking the approval of the protocol review committee and institutional ethics committee.

Methodology

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A total of 100 children (120 feet) were treated. Among these 100 children, 50 children (60 feet) were treated by standard Ponseti method and 50 children (60 feet) were treated by accelerated Ponseti method. The patients were randomized by computer generated numbers to either the standard Ponseti or the accelerated Ponseti method. All children were treated on an outpatient basis to reduce any bias from altered compliance and enabling us to directly compare the efficacy of two methods in terms of correction of the deformity. Each clubfoot was scored each week using Pirani scoring system before cast application. Children were made to sleep by giving breast milk before cast application. In the standard Ponseti group, each foot was manipulated weekly and corrective above knee casts with knee in 90° of flexion were given. Step by step correction as recommended by Ponseti was followed. First cavus is corrected followed by varus and equinus is corrected at last. In the accelerated group, each foot was manipulated at every five days. The principle of correction was the same as that of Ponseti technique.

In both the groups, tenotomy was done when cavus, adductus, and varus are fully corrected but ankle dorsiflexion remained < 10° above neutral. It was made certain that abduction was adequate before performing tenotomy. Percutaneous Achilles tenotomy was done as an outpatient procedure using local anesthesia. Before the application of final cast or tenotomy, measurements were taken so that when the child comes for final cast removal, brace would be ready. Immediately after the removal of final cast, a Dennis Browne splint

was applied. In the case of unilateral CTEV, brace was set at 70° external rotation on involved side and 40° rotation on uninvolved side. In cases of bilateral CTEV, both feet were set at 70° external rotation.

Results

A total of 100 children (120 feet) were treated; of which 50 children (60 feet) were treated by standard Ponseti method and 50 children (60 feet) were treated by accelerated Ponseti method. In the standard Ponseti group, 8 children had bilateral clubfoot, 17 were unilateral on left side, and 17 were unilateral on right side. Among 50 children, 33 (66%) were male and 17 (34%) were female. Mean age at presentation was 25.3 days. The mean Pirani score at presentation was 4.60. The mean number of days the child was in cast was 53.4. Eight cases (16%) had a relapse. All relapses were corrected by repeat casting. Mean Pirani score at 3 months follow-up was 0.11.

In the accelerated Ponseti group, 10 children had bilateral clubfoot, 15 were unilateral on left side, and 15 were unilateral on right side. Among 50 children, 27 (54%) were male and 23 (46%) were female. Mean age at presentation was 27.5 days. Mean Pirani score at presentation was 4.71. The mean number of days the child was in cast was 40.12. Mean Pirani score at 3 months follow-up was 0.13. In our study, idiopathic clubfoot was seen more common in male child than female child.

Table 1: Gender distribution

Procedure	Male (%)	Female(%)	Total
Standard ponseti	33 (66)	17 (34)	50
Accelerated ponseti	27 (54)	23(46)	50

Table 2: Mean pirani score at presentation

Procedure	Score
Standard ponseti	4.60
Accelerated ponseti	4.71

Table 3: Relapse rate

Procedure	Relapse rate (%)
Standard ponseti	16
Accelerated ponseti	22

Table 4: Mean pirani score at 3 months follow-up

Procedure	Mean pirani score at 3 months follow-up
Standard ponseti	0.11
Accelerated ponseti	0.13

Discussion

At present, the Ponseti method is the most commonly used modality for management of CTEV[8]. The traditional Ponseti technique of weekly manipulation and casting is inexpensive, has a relatively short learning curve, and has yielded excellent results in both in short- and longterm studies[9]. Although Giesberts et al.[10] have published a review article showing that accelerated protocols have a similar efficacy and safety profile as the traditional protocols, no ideal casting interval has been suggested. Our aim was to establish

the effectiveness of cast application at every five day accelerated protocol vis-à-vis the standard protocol in our study.

CTEV is one of the most common congenital anomalies occurring in children[11]. The method of serial manipulation and casting developed by Ponseti for congenital clubfoot was instituted in an effort to achieve a plantigrade, functional foot without the need to resort to major surgical intervention. The Ponseti method was widely accepted and practiced, giving reliably long-term results. We treated clubfoot cases by Ponseti which involves changing of plaster at every seven days and accelerated Ponseti method, which involves changing

the plaster at every five days. We conducted special clubfoot clinics and did our casting on fixed days in a week for standard Ponseti technique so that we gave the chance of new patient's parents to meet old patient's parents and assure them about treatment and compliance[1,4]. We followed Pirani scoring system and performed tenotomy, whenever necessary. Following cast correction, a Dennis Browne splint was applied and bracing protocol followed. In both the groups, the mean age of presentation was 28.5 days. Mean number of casts required for correction in accelerated group (6.04) was comparable with standard group (5.66). Mean number of days in cast was 40.12 days in accelerated group, whereas it was 53.4 days in standard group.

In the accelerated group, 78% of cases remained corrected at 3 months follow-up which is comparable with 84% of standard group. Relapse rate was 22% in accelerated group and 16% in standard group, which is statistically insignificant. In our study, most of the relapses were of forefoot adduction type and equinus type which were corrected mostly by casting. Relapses were found to be mainly due to noncompliance of bracing protocol. This could be reduced by stressing the importance of braces at every visit and having follow-up at regular intervals. We taught the parents how to wear those braces and monitored them while applying it. If the long-term results of accelerated Ponseti method become comparable to those of standard Ponseti method, it can offer patients a number of benefits. The number of days the child was in plaster was reduced in accelerated method. This would provide the parents with the alternative of more rapid treatment. Other advantages are a reduction in the likelihood of plaster slipping and chance for more intensive education regarding the importance of braces, with more visits over a shorter period[12,13]. Osteopenia after immobilization in above-knee plasters has been reported by Morcuende et al., but these findings resolved within a few months after plaster removal[14,15]. It is possible that the accelerated method might reduce this problem still further.

Conclusion

We conclude that the clubfeet treated by conventional Ponseti method and accelerated Ponseti method is the same. The accelerated Ponseti method is as effective as standard Ponseti method in the treatment of idiopathic CTEV.

Conflict of Interest: Nil

Source of support: Nil

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