

## ORIGINAL ARTICLE

## The Neglected Clubfoot: Is Ponseti Method Effective?

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## DISCLOSURE

The author declares no  
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**ABSTRACT**

**Background:** Neglected clubfoot is still a common presentation especially in developing countries typified by poor access to health care, leading to these patients with untreated clubfoot to present at walking age. It presents a challenge to management, with opinions divided on the appropriate initial modality of treatment; whether operative or conservative.

**Objective:** To evaluate the effectiveness of the Ponseti technique in the treatment of neglected clubfoot.

**Methodology:** Thirteen neglected clubfeet, in 10 patients who presented after walking age were evaluated. Pre-treatment Pirani scores were obtained, and all patients were treated by the method described by Ponseti (manipulation and casting, including Achilles tenotomy as needed). Post treatment Pirani scores were also obtained at the end of treatment.

**Results:** A painless plantigrade foot was obtained in all (100%) feet without the need for extensive soft tissue release and/ or bony procedures.

**Conclusion:** Ponseti method is effective in the treatment of neglected clubfoot presenting after walking age.

**Keywords:** Pirani score, Plantigrade foot, Tenotomy, Soft tissue release

## INTRODUCTION

Clubfoot, a major structural birth defect occurs when a normally developing foot turns into the shape of a club during the second trimester of pregnancy.<sup>1</sup> The Ponseti technique (serial manipulation and

application of a well molded cast) is considered to offer the best and safest correction of most clubfeet in infants and has gained considerable popularity in the last decade with a success rate of over 90%.<sup>2,3</sup>

However, most of these studies are done in younger children before walking age.

Neglected clubfoot is one in which there has never been an initial treatment or perhaps inadequate or incomplete treatment, which is subsequently made worse by weight bearing on the lateral side or dorsum of the foot, exaggerating the abnormal shape and causing further deformation.<sup>3</sup> The contracted soft tissues on the medial part of the foot are then encouraged to contract further.

The Ponseti technique consists of weekly serial manipulation and casting (using a thin layer of casts-above knee).<sup>1</sup> In the first cast, the forefoot is supinated to align with the hindfoot, while in subsequent casts, adduction of the foot is maintained while applying counter pressure on the talus. The affected foot (feet) is reassessed weekly for correction. In feet that have achieved midfoot correction with residual equinus, tenotomy is indicated.

The Pirani scoring system is a method of grading the severity, monitoring the natural history or follow up in the treatment of clubfoot; and is composed of six signs with three related to the hindfoot (severity of the posterior crease, emptiness of the heel and rigidity of the equinus), and the other three related to the midfoot (curvature of the lateral border of the foot, severity of the medial crease and position of the lateral part of the head of talus).<sup>4</sup>

Neglected clubfoot is a common problem in low and medium income countries where universal health coverage is inadequate. Approximately 80% of children with congenital clubfoot are born in developing countries, many of whom have limited or late

access to the health care system and trained specialist for treatment.<sup>4</sup>

Most of the literature on the management of neglected clubfoot focused on operative treatment via soft tissue release, tendon elongation, use of external fixators (including Ilizarov frame) and osteotomies.<sup>3</sup>

This study was done to evaluate the efficacy of the Ponseti technique of treatment in the management of neglected clubfoot.

#### METHODOLOGY

Thirteen neglected clubfeet in 10 patients who presented after walking age were evaluated to determine the effectiveness of the Ponseti technique in its management. This was a prospective study done between June 2016 and July 2017, at the Nnamdi Azikiwe University Teaching Hospital Nnewi. Inclusion criteria were patients (from 2 years and above) presenting with clubfoot to the outpatient department, who have not had any prior treatment. Patients (or caregiver) who refused consent or who had previous treatment were excluded from the study.

The Pirani score of each clubfoot was obtained by the lead author and recorded before serial manipulation and casting were begun. The casts followed the standard Ponseti technique<sup>1</sup>. Weekly re-assessment of the clubfoot deformity and the Pirani score were obtained, until full correction of the deformity was obtained (Pirani score of 0). Percutaneous tenotomy or elongation of the tendo-Achilles (if patient was older than 10 years) was done when the forefoot and midfoot deformities were corrected with a residual equinus deformity.

Statistical package for social sciences (SPSS) software version 22.0 was used for the purpose of analyzing data; comparisons between means were done with students t-test and p value of <0.005 was considered statistically significant.

**RESULTS**

A total of 10 patients with 13 clubfeet were evaluated. The median age of the patients was 17.5 years. Table 1 shows the age distribution of the patients.

**Table 1.** Age distribution of patients

Age range (years)	Frequency
2- 10	3
11- 20	5
21- 30	2

There were 7 females and 3 males; 7 had unilateral deformity while 3 had bilateral deformity. 10 of the clubfeet analyzed had a

severe deformity corresponding to a Pirani score of 4- 6, with a mean Pirani score of 4.89 The average midfoot and hindfoot score were 2.46 and 2.5 respectively. The average number of casts applied was 5.92.

**Table 2.** Frequency of surgical interventions done

Surgical Intervention	Frequency
ETA	6
ETA + Tibialis anterior transfer	2
Tenotomy	4
No surgical intervention	1

ETA: Elongation of Tendo-Achilles

There was a statistically significant difference (p=0.001) between the pre-treatment Pirani score and post-Ponseti treatment Pirani score (before any soft tissue procedure including tenotomy was done); Table 3.

All patients achieved painless plantigrade feet without extensive soft tissue surgery.

**Table 3.** Effect of Ponseti technique on the Pirani score

Pirani score at diagnosis (Mean ± SD)	End Pirani score (Mean ± SD)	t
4.89 ± 1.04	1.77 ± 0.75	8.46

P=0.001

**Table 4.** Correlation between pre-treatment Pirani score and number of casts used

Pirani score at diagnosis (Mean ± SD)	Number of casts (Mean ± SD)	t	p
4.69 ±1.39	5.9 ±2.3	12.1	0.005

## DISCUSSION

The Ponseti method of manipulation and casting has been shown to be effective in the treatment of idiopathic clubfoot with correction rates of > 90% in patients below walking age.<sup>1,2</sup> Following the success of the Ponseti method in treating idiopathic clubfeet, attempts were made in this study to utilize this method in the treatment of neglected clubfoot. The neglected clubfoot poses a significant challenge, usually characterized by markedly contracted soft tissues, with bony deformity involving the neck of the talus and the navicular with subluxation of the cuboid.<sup>5</sup>

The median age of the patients in this study was 17.5 years, with a mean pre-treatment Pirani score of 4.89. In a study by Mehtani *et al.* in which a total of 62 neglected clubfeet in 41 patients were analyzed (after treatment with the Ponseti technique), the mean age group was 3.1 years, and the mean Pirani score before treatment was 4.21.<sup>6</sup> Similar findings were also noted in a study by Sinha *et al.*, where the mean age of presentation was 2.6 years, and the mean pre-treatment Pirani score was 5.41.<sup>7</sup> This difference in mean age of the patients may represent health care seeking habits in the different study populations.

The mean number of casts used in this study was 5.9, and there was no correlation between the number of casts and the pre-treatment Pirani score. This was similar to the study done by Sinha *et al.*, where no correlation was found between the number of casts and the pre-treatment Pirani score, though they found a moderate positive correlation between the Dimeglio scores and the number of casts used.<sup>7</sup>

Neglected clubfoot has been treated in the immediate past with bony surgery and extensive soft tissue release. These techniques are difficult, costly and with substantial complication.<sup>8,9</sup>

In this study, 84.7% achieved full correction without needing any bony surgeries or soft tissue surgeries (except tenotomy/lengthening of tendo-Achilles). This is similar to results obtained by Ponseti *et al.* in Brazil after 17 children (24 feet) with neglected clubfeet had Ponseti treatment, with 16 feet (67%) having full correction without the need for extensive surgeries; and it was found that those who finally needed surgery ended up with a lesser surgical intervention.<sup>10</sup>

Ponseti *et al.* also reported the use of Ponseti treatment in 260 neglected clubfeet and 83% were able to avoid any surgery besides a posterior Achilles tenotomy.<sup>11</sup> In our study, all feet treated with Ponseti method achieved painless plantigrade clubfeet with only 2 patients (15.4%) needing additional tibialis anterior tendon transfer. No bony surgeries were done. All other patients had either tenotomy (30.8%), open elongation of the tendo-Achilles (46.2%) or no surgical intervention (7.7%). This is similar to results obtained by Sinha *et al.* who evaluated 41 clubfeet in 30 patients. All of the patients' feet achieved full correction without extensive soft tissue surgery or bony surgeries.

## CONCLUSION

This study showed that the Ponseti method is effective in the treatment of neglected clubfoot, avoiding the need for major soft tissue releases and bony surgeries.

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