



## Management of Idiopathic Clubfoot by Ponseti Method- Our Experience

Authors

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### Abstract

*Congenital clubfoot is one of the most common musculoskeletal birth abnormalities, affecting 1–2 newborns out of every 1000 live births. However, it continues to test the skills of the paediatric orthopaedic surgeon because it has a notable tendency to relapse, regardless of whether the foot is treated conservatively or surgically.*

**Methods:** *It was prospective study, The study was conducted in the department of orthopaedics, Katihar Medical College & Hospital. A total of 36 feet confirmed by experts to have untreated Idiopathic Clubfoot were enrolled in the study. The severity of the deformity for each foot was graded according to Pirani scoring, the period of the study from December 2019 to August 2021.*

**Results:** *The mean age of the study population was 4.416 months. Female cases were predominantly higher than male cases. Mean Pirani score before treatment  $3.88 \pm 0.81$  (range between 1.0– 6.0). 28.6 % of male patients and 22.7% of female patients needed percutaneous tenotomy. We have found significant correlation between before and after treatment of Clubfoot, The correlation factor was 0.687 and p value was  $<0.0001$ .*

**Conclusion:** *The accelerated Ponseti approach is a conservative treatment option for Congenital Talipes Equino varus that is just as effective as the standard Ponseti technique. Patients having a lower Pirani score at initial presentation respond better and faster to therapy than those with a higher Pirani score at first presentation. Treatment should begin as soon as possible, and the casting time frame can be significantly reduced by adopting an expedited procedure.*

### Introduction

Clubfoot is a congenital condition that affects approximately 100,000 newborns each year. If one or both of the baby's feet are bent inward, this condition is known as "clubfoot," and it makes it necessary for the child to walk on his ankles. If the condition is not treated, it could have a long-term impact on the patient's health. 80% of clubfoot instances are seen in developing countries.

Hippocrates reported clubfoot approximately 400 BC, making it one of the most prevalent congenital orthopaedic abnormalities.<sup>[1]</sup> At birth, 1–2 kids per 1000 live births are affected by congenital clubfoot, the most prevalent musculoskeletal deformity.<sup>[2]</sup> Approximately 100,000 new children are infected each year, with the majority of them being born in low- and middle-income countries (80%, according to some estimates).<sup>[3]</sup>

Congenital and acquired equinovarus deformities are the two main types. Idiopathic and non-idiopathic forms of the congenital are the next levels of classification. An isolated skeletal anomaly, usually bilateral, is more likely to respond well to conservative therapy and has a tendency to repeat later in life, making it the most common variety.

There are no known cures for clubfoot, which can be caused by a variety of factors. A functional, pain-free, plant-grade foot with high mobility and no calluses is the ultimate goal of treatment, which is to minimise or remove these four abnormalities (equinus, rear foot varus, fore foot adductus, and cavus).

When it comes to non-surgical treatment, mild manipulations are followed by the installation of either a short or lengthy leg cast every week.<sup>[4]</sup> These strategies can be successful when implemented appropriately, however most writers have reported success rates of between 15 and 50 percent.<sup>[5]</sup>

One exception is Ponseti approach, which is a combination of serial manipulation, cast application, and maybe a percutaneous Achilles tenotomy. There are reports of short-term success rates in excess of 90%,<sup>[6]</sup> and long-term results that are just as impressive.<sup>[7]</sup>

## Methods

It was prospective study, The study was conducted in the department of orthopaedics, Katihar Medical College & Hospital. A total of 36 feet confirmed by experts to have untreated Idiopathic Clubfoot were enrolled in the study. The severity of the deformity for each foot was graded according to Pirani scoring, the period of the study from December 2019 to August 2021.

## Methods of Data Collection

Complete history included consanguinity, prenatal, intranatal, postnatal and developmental milestones was taken. The severity of the deformity was graded according to Pirani scoring. Patients were educated about the condition, various methods of management and more

importantly the course of Ponseti method. Babies were followed up for minimum of 12 months.

## Inclusion Criteria

- Idiopathic
- Age group: Birth up to 2 years.
- Consent to participate in the study.

## Exclusion Criteria

- Aged > 2 Years.
- Affections of Spine or Hips
- Associated neurological defects.

The Pirani severity scale was used to measure the severity of the deformity at the time of presentation and at each subsequent visit before the cast was put in place. To determine the effect of various therapies on the degree of deformity, the score was plotted against a specific time interval.

Hastened Ponseti Casting was used in the care of these patients, in which the typical weekly manipulation and cast change was accelerated and the equinus deformity was corrected percutaneously at the end. A three-week corrective cast was put on patients after the final correction or percutaneous tendoachilles tenotomy was completed. In order to perform the tenotomy, we employed an anaesthetic. Dennis Browne splints were used until patients were able to walk on their own.

The pirani severity assessment was used to evaluate the results after treatment was completed and at many follow-ups.

## Pirani's method of clubfoot evaluation<sup>[8]</sup>

In his research, Dr. Shafique Pirani found six previously unidentified clinical indications of clubfoot. In this case, three of the symptoms point to hind foot contracture (HFC), whereas the other three point to midfoot contracture (MFC) as the most likely culprit (MFC) Assuming the foot deformity is bilateral, the abnormal area on the affected foot is compared to the comparable area on the normal foot and the score is calculated: -

0 = no deformity

0.5 = moderate deformity

1.0 = severe deformity

**Statistical Analysis**

Data was checked for accuracy and completeness then coded and entered into (Statistical Package for the Social Sciences) version 19.0 for analysis. The results presented in frequency tables, cross tabulations and figures. Categorical data are presented as frequency with percentages. Continuous data with normal distribution are presented as mean with standard deviation. Chi-square or Fisher Exact and unpaired t test has been used to find the significance of study parameters on categorical scale between two groups as applicable. A *p*-values <0.05 were considered significant.

**Results**

**Age distribution among study population**

Age in Months	No of Cases	Percentage
0-1 month	14	38.9
1-6 months	12	33.3
6-12 months	08	22.2
12-24 months	02	5.6
<b>Total</b>	36	100.0
<b>Mean Age</b>	4.416±3.97	

The most common age group was found in 0– 1 month with 14 (38.9%) patients and another 2 (5.6%) were less than 12-24 months of age. The mean age of the study population was 4.416 months.

**Sex Distribution**

Sex	No of Cases	Percentage
Male	14	38.9
Female	22	61.1
<b>Total</b>	36	100.0
<b>Male Female Ratio</b>	1.57:1	

We have found, female cases were predominantly higher than male cases, i.e. 61.1% Female & 38.9 % Male respectively. The male female ratio was 1.57:1.

**Side of involvement among study population**

Side of involvement	No of Cases	Percentage
Unilateral	29	80.6
Bilateral	7	19.4
<b>Total</b>	36	100.0
<b>Unilateral : Bilateral</b>	4.14:1	

We have found 29 cases were unilateral (806%) and 07 (19.4 %) cases were bilateral. Laterality ratio was 4.3:1

In this study total (7x2=14+29= 43 feet) (36 patients) were treated by accelerated method and end point of casting treatment. 29 unilateral and 07 bilateral cases among 36 cases.

**Mean Pirani score before treatment among study population**

Pirani score	Total no of Cases(n=36)	Mean	SD
1.0 – 2.0	01	1.50	±0.00
>2.0 – 4.0	23	3.54	±0.39
>4.0 – 6.0	12	4.75	±0.45
<b>Total</b>	36	3.88	±0.81

In Table no.6. we found, mean Pirani score before treatment 3.88±0.81 (range between 1.0– 6.0).

**Distribution of Percutaneous Tenotomy done according to sex**

Percutaneous Tenotomy	Male (n=14)		Female (n=22)	
	No	%	No	%
Done	04	28.6	05	22.7
Not Done	10	71.4	17	77.3
<b>Total</b>	14	100.0	22	100.0

28.6 % of male patients and 22.7% of female patients needed percutaneous tenotomy.

**No of Casts**

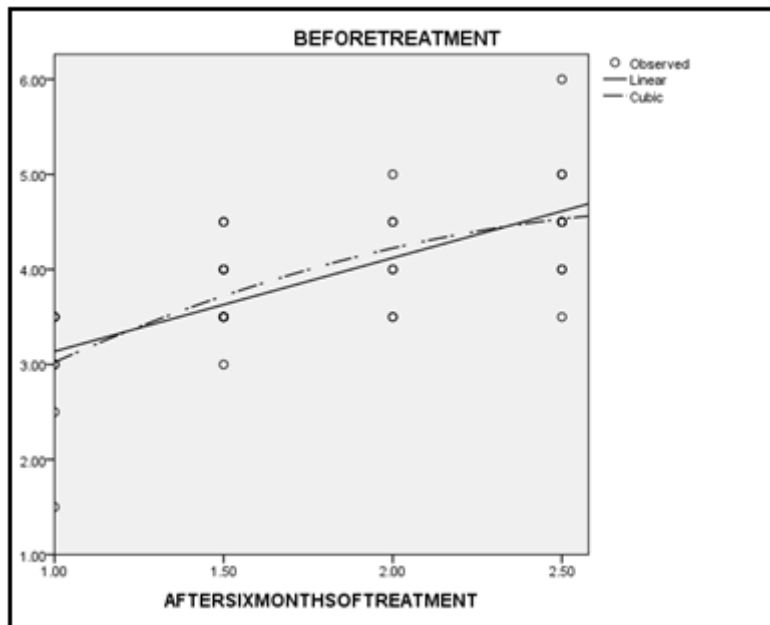
No of casts	No of Cases	Percentage
2	00	0
3	01	2.8
4	03	8.3
5	09	25.0
6	06	16.7
7	16	44.4
8	01	2.8
<b>Total</b>	36	100

Total number of casts required for the study was 216 with a mean & SD value of 6.00±1.19.

**Correlation between Before & after 6 months of Treatment according to Pirani score**

Before Treatment		After 6 months of treatment		Pearson Correlation	p Value
Mean	SD	Mean	SD		
3.88	±0.81	1.76	±0.56	.687	<0.0001

**Correlation between Before & after 6 months of Treatment according to Pirani score.**



We have found significant correlation between before and after treatment of Clubfoot, The correlation factor was 0.687 and p value was <0.0001.



**Discussion**

Patients with idiopathic clubfoot who presented at Katihar Medical College and Hospital during the study period who were treated with ponseti method were included in this study. It was necessary to get a complete medical history, which included information on any previous

children's pregnancies, births, and postpartum periods. Deformity severity was rated using Pirani grading. More significantly, patients were informed about the illness and how to manage it using Ponseti's method. A minimum of 12 months of follow-up was required for all newborns.

Treatment options for idiopathic clubfoot include non-operative measures as well as surgical resection. Despite the fact that these methods have been tried and tested in several centres, there are still debates over their effectiveness. Comparisons between therapy groups and long-term follow-up studies establishing effects are challenging since there are no criteria for determining functional outcomes.

The conservative treatment method of congenital talipes equino varus devised by Prof. Ignacio ponseti 2 is based on the fundamentals of the kinematic and pathoanatomical deformity of the deformity, which begins at birth and is based on the fundamentals of kinematics and pathoanatomical deformity, Lloyd-Roberts wrote.<sup>[9]</sup> This method successfully corrects clubfoot in infants without the need for expensive and time-consuming surgery.

43 feet (36 patients) of accelerated casting treatment were used, and the end point of treatment was ten casts. After casting, if necessary, a heel cord tenotomy was performed and a bracing protocol was initiated.

#### **Age Distribution**

In this study, the most common age group was found in 0– 1 month with 14 (38.9%) patients and another 2 (5.6%) were less than 12-24 months of age. The mean age of the study population was 4.416 months. When the feet were divided on the basis of the age at first presentation, it was seen that a large proportion of patients seen were one month old. The youngest patient included in this study was 12 days old and the eldest was 16 months old.

#### **Sex Distribution**

Female instances were found to be more prevalent than male cases in this study, with 61.1 percent female and 38.9 percent male cases, respectively. 1.57:1 was the male-to-female ratio. Kite's <sup>[10]</sup> series had a male-to-female ratio of 2.07:1, whereas Wyne Davis' <sup>[11]</sup> series had a male-to-female ratio of 2.17:1. Male to female ratio was 2.02:1 in Jose A. Morcuende et al.<sup>[12]</sup> dataset.

#### **Laterality**

In this study, 29 cases were unilateral (806%) and 07 (19.4 %) cases were bilateral. Laterality ratio was 4.3:1

In this study total (7x2=14+29= 43 feet) (36 patients) were treated by accelerated method and end point of casting treatment. 29 unilateral and 07 bilateral cases among 36 cases. Other series presented by Wyne Davis <sup>[11]</sup> found (44 % bilateral and 56 % unilateral), Mckay (1983) series with an incidence of unilateral to bilateral ratio of 1:1.7,

#### **Distribution of unilateral & bilateral cases according to Age and Sex**

We found 29 cases of Unilateral laterality and 7 occurrences of Bilateral laterality when looking at cases based on gender. There were 19 (65.5 percent) female cases and 10 (34.5 percent) male cases out of a total of 29 Unilateral cases. Out of the seven bilateral cases, four patients (57.1 percent) were men, while three (42.9 percent) were women. Sex and Laterality were shown to have no statistically significant differences. There was a chi-square value of 1.2183, and the p value was 0.269.

Our study indicated that 37.9% of the instances were in the 0-1 to 1-6 months age range on the unilateral side, which is the largest percentage. 43.0 percent of the patients on the Bilateral side are under the age of one year old. Laterality and age did not differ much. It had a chi-square value of 0.5709 and a significance level of 0.903.

#### **Pirani Scores Vs Number of Cast Required**

Initial Pirani score can be used to classify the feet. Feet with an initial Pirani score of 3-4 are more receptive to correction and respond more quickly than feet with an initial Pirani score of 4 and 6. (i.e., more severe and more rigid deformity). It took an average of 216 cast applications to fully correct the deformity in patients with a total of 216 casts, with a mean and standard deviation of 6.00±1.19.

#### **Tenotomy**

In this study, 28.6 % of male patients and 22.7% of female patients needed percutaneous tenotomy.



### Correlation between Before & after 6 months of Treatment according to Pirani score

After therapy for Clubfoot, we identified a correlation factor of 0.687 and a p-value of less than 0.01 that was statistically significant.

A study that looked at 50 patients with idiopathic clubfoot deformity treated with the Ponseti protocol and found that 90% of them just needed percutaneous tenotomy of the achilles tendon had remarkably identical results to ours.

According to John E. Herzenberg,<sup>[13]</sup> MD, 88 percent of the 46 clubfoot patients he treated with the Ponseti approach had excellent or excellent outcomes, and just 3 percent of the patients had recurrences. The number of days spent in cast therapy was significantly decreased.

Using an expedited type of ponseti therapy, a prospective trial by P.Harnett et al.<sup>[14]</sup> raised the usual weekly once manipulation and charging of cast to three times a week. The average number of castings required in this study was five. At the beginning of the trial, the median Pirani score was 5.5; following therapy, the median Pirani score was 0.5. The median number of casts and the median Pirani score before and after therapy were nearly identical. (The difference is insignificant, with a P 0.05).

### Conclusion

The accelerated Ponseti approach is a conservative treatment option for Congenital Talipes Equino varus that is just as effective as the standard Ponseti technique. Patients having a lower Pirani score at initial presentation respond better and faster to therapy than those with a higher Pirani score at first presentation. Treatment should begin as soon as possible, and the casting time frame can be significantly reduced by adopting an expedited procedure.

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