

**A Hospital-Based Study to Assess the Orthopaedic Management of Club Foot: Observational Research****Rajeev Kumar Rajak<sup>1</sup>, Barun Kumar Golwara<sup>2</sup>, Randhir Kumar<sup>3</sup>**<sup>1</sup>Associate professor, Department of Orthopaedics, Government medical College, Bettiah, Bihar, India<sup>2</sup>Assistant Professor, Department of Orthopaedics, Government medical College, Bettiah, Bihar, India<sup>3</sup>Senior Resident, Department of Orthopaedics, Government medical College, Bettiah, Bihar, India

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Conflict of interest: Nil

**Abstract****Aim:** The aim of the present study was to assess the orthopaedic management of club foot at tertiary health care centre.**Methods:** This was cross-sectional study carried out in the Department of Orthopaedics with idiopathic club foot less than one year age presented to the Orthopaedics Department during the four-years were included into the study. In the four-years period there were 100 patients after written explained consent were enrolled to study. All necessary details of the patients were noted like age, sex, pre interventions modified Pirani score noted.**Results:** The majority of the patients were in the age group of 0-3 (months) were 42%, followed by 3-6 were 32%, 6-9 were 16%, 9-12 were 10%. The majority of the patients were Female i.e. 60% and Male were 40%. In all the age groups the Post treatment Pirani score significantly differed as compared to pre-treatment score i.e. 0-3 were  $5.32 \pm 2.18$  and  $1.55 \pm 1.035$  ( $t=8.82, df=72, p<0.01$ ); 3-6 were  $5.48 \pm 0.82$  and  $1.58 \pm 1.32$  ( $t=12.58, df=56, p<0.001$ ); 6-9 were  $5.75 \pm 2.15$  and  $2.18 \pm 0.96$  ( $t=9.91, df=26, p<0.05$ ); 9-12 were  $5.36 \pm 1.24$  and  $1.86 \pm 1.34$  ( $t=10.20, df=24, p<0.001$ ) were statistically significant.**Conclusion:** According to the results of our investigation, the ponsetti approach was very efficient in the management of idiopathic club foot, as measured by the Pirani score for club foot assessment almost all the patients were doing well with this treatment.**Keywords:** Club Foot, Modified Pirani Score, Ponsetti technique, Outcome of Club footThis is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.**Introduction**

Idiopathic congenital talipes equinovarus (CTEV) is a relatively common complex three-dimensional deformity of the foot affecting approximately 1–2/1,000 newborns. It is a common and challenging musculoskeletal deformity. [1] It represents a congenital dysplasia of musculoskeletal tissues distal to the knee. [2] All the medial soft tissues distal to the knee are contracted. This deformity has intraosseous and interosseous components resulting from abnormal bony relationship. It mainly affects the relationship of the talus with the tarsal bones so that, these bones assume extreme position of flexion, adduction and inversion at birth. [3] This results in hind foot equinus, hind foot varus and fore foot varus. [4] In cases of severe club foot deformity gait is grossly affected and neglected patient walks on their ankles. [4] The worldwide prevalence is 0.6 to 1.5 per 1000 births, in India the prevalence is 1.19 per 1000 birth. [5,6]

The mechanism by which club foot develops is unknown but mechanical, neurological, muscular, bony, connective tissue and vascular mechanisms all have been proposed. [7] The etiology of club foot is not well elucidated while both genetic and environmental factors are frequently implicated and a little is known about environment risk factors. [8] It is a fact that even today club foot is still a challenge for paediatric orthopaedic surgeons. [9]

Clubfoot may occur in isolation or be associated with other syndromes, neurological conditions and congenital malformations. Clubfoot is a burden to the child and can diminish the quality of life. Early screening, recognition, and prompt treatment are crucial in achieving a near normal foot. Ponseti method revolutionised the treatment of CTEV with an aim to achieve a plantigrade foot. [10]

The non-operative therapy of clubfoot is widely considered as the first line of defence and should

begin as soon as feasible after birth. The moderate foot massage followed by splinting in 400 BC, which was the first non-operative treatment. Guerin invented the plaster-of-Paris cast in 1836. Devices like the Thomas wrench, which practised quick correction through strong manipulation, were introduced around the turn of the century. [11] Dr. Hiram Kite pioneered the process of delicate manipulation and casting in 1930. Dr. Ignacio V. Ponseti invented the most frequently used manipulation and serial casting technology in 1948. The Ponseti technique has been the most widely accepted method, with a few studies demonstrating its short- and long-term success at various locations. [12,13] It includes a correction phase wherein the child undergoes serial corrective casting and maintenance phase where the child is put on a bracing protocol. Surgical intervention may be required in 3-5% of cases. [14] Despite good outcomes of ponseti treatment, achieving them on a larger scale requires substantial involvement from parents, medical fraternity, and government and non-government organisations. A well-structured and dedicated clubfoot clinic are necessary for efficient management of clubfoot at a larger scale.

The long-term aims of treatment are a pain-free, flexible, functional foot, with good mobility and tolerating normal footwear. Treatment remains controversial as initial correction can be achieved by surgical or non-surgical means or a combination of both. The Ponseti technique has been the most widely accepted method, with a few studies demonstrating its short- and long-term success at various locations. [12,13]

The aim of the present study was to assess the orthopaedic management of club foot at tertiary health care centre.

### Materials and Methods

This was cross-sectional study carried out in the Department of Orthopaedics at Government medical College, Bettiah, Bihar, India with idiopathic club foot less than one year age presented to the Orthopaedic Department during the four-years were included into the study. In the four-years period there were 100 patients after written explained consent were enrolled to study. All necessary details of the patients were noted like age, sex, pre interventions modified Pirani score noted.

All of the patients underwent ponseti technique for the management of idiopathic club foot. The Ponseti method consists of 2 equally important phases: the corrective phase and the maintenance<sup>14</sup> phase and consist of serial manipulation, casting and tenotomy of the Achilles Tendon.<sup>15</sup> This is followed by the use of foot abduction brace to prevent the occurrence of relapse. All these procedures are divided into two phases;8 Casting Phase which consist of Manipulation, Casting and Tenotomy [14] Maintenance Phase which is the use of Foot Abduction Brace to prevent relapse or recurrence. [15,16] All such procedures were carried out in our institute At the end all of them evaluated by Pirani score. The statistical analysis was done by paired t-test and calculated by SPSS 19 version software.

### Results

**Table 1: Age and gender distribution**

Age groups	N	%
0-3	42	42
3-6	32	32
6-9	16	16
9-12	10	10
Total	100	100
<b>Gender</b>		
Female	60	60
Male	40	40

The majority of the patients were in the age group of 0-3 (months) were 42%, followed by 3-6 were 32%, 6-9 were 16%, 9-12 were 10%. The majority of the patients were Female i.e. 60% and Male were 40%.

**Table 2: Distribution of the patients as per the Pirani score**

Age group	Pre-treatment score	Post treatment score	p-value (paired t-test)
0-3	5.32 ± 2.18	1.55 ± 1.035	t=8.82,df=72,p<0.01
3-6	5.48 ± 0.82	1.58 ± 1.32	t=12.48,df=56,p<0.001
6-9	5.75 ± 2.15	2.18 ± 0.96	t=9.91,df=26,p<0.05
9-12	5.36 ± 1.24	1.86 ± 1.34	t=10.20,df=24,p<0.001

In all the age groups the Post treatment Pirani score significantly differed as compared to pre-treatment

score i.e. 0-3 were 5.32 ± 2.18 and 1.55 ± 1.035 (t=8.82,df=72,p<0.01); 3-6 were 5.48 ± 0.82 and

1.58 ± 1.32 (t=12.58,df=56,p<0.001); 6-9 were 5.75 ± 2.15 and 2.18±0.96 (t=9.91df=26,p<0.05); 9-12 were 5.36 ± 1.24 and 1.86 ± 1.34 (t=10.20, df=24,p<0.001) were statistically significant.

### Discussion

Congenital talipes equinovarus (CTEV) is one of humanity's oldest and most frequent congenital malformations, affecting one to two out of every thousand live births. [17] The four essential elements of the Ankle equinus, heel varus, forefoot adduction, and cavus are all deformities. [18,19] The non-operative therapy of clubfoot is widely considered as the first line of defence and should begin as soon as feasible after birth. Clubfoot is one of the most common deformity of the lower extremity encountered in paediatric orthopaedic practice. The worldwide prevalence is 0.6 to 1.5 per 1000 births, in India the prevalence is 1.19 per 1000 birth. [20-22] Clubfoot may occur in isolation or be associated with other syndromes, neurological conditions and congenital malformations. Clubfoot is a burden to the child and can diminish the quality of life. [23,24]

The majority of the patients were in the age group of 0-3 (months) were 42%, followed by 3-6 were 32%, 6-9 were 16%, 9-12 were 10%. The majority of the patients were Female i.e. 60% and Male were 40%. Similarly Gupta A et al and Pulak S et al had a higher number of occurrences of clubfoot in males with 81% and 80% respectively. [25,26] There is a higher incidence of clubfoot in male children compared to females. According to Lochmiller C et al 25% of all isolated cases had a positive family history and Engell V et al has stated that heritability of isolated clubfoot was 30%. [27,28]

In all the age groups the Post treatment Pirani score significantly differed as compared to pre-treatment score i.e. 0-3 were 5.32 ± 2.18 and 1.55 ± 1.035 (t=8.82,df=72,p<0.01); 3-6 were 5.48± 0.82 and 1.58 ± 1.32 (t=12.58,df=56,p<0.001); 6-9 were 5.75 ± 2.15 and 2.18±0.96 (t=9.91df=26,p<0.05); 9-12 were 5.36 ± 1.24 and 1.86 ± 1.34 (t=10.20,df=24,p<0.001) were statistically significant. According to recent studies, illiteracy and poverty are two factors that cause some affected children to be neglected, making it more difficult to correct the deformity. [29] Oligohydramnios, family history, male baby, first baby, and twin pregnancy are all risk factors. Because clubfoot is a visible deformity, there is no need for a particular inquiry or screening programme to discover it, albeit it can be detected prenatally using high-resolution ultrasound during the second trimester. [30]

Considering etiological theories of connective tissue hypothesis the primary abnormality of connective tissues is responsible for club foot deformity which is supported by the association of club foot with

different anomalies. [31] Wazir Fahad Jan 7 also found that Majority of the patients obtained full correction with this method. [32]

### Conclusion

According to the results of our investigation, the ponsetti approach was very efficient in the management of idiopathic club foot, as measured by the Pirani score for club foot assessment almost all the patients were doing well with this treatment.

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