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## A study of orthopaedic management of club foot at tertiary health care centre

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### Abstract

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

**Methods:** This cross-sectional research was conducted at the Orthopaedic Department at SGRRIM&HS, Dehradun, focusing on infants under one year of age with idiopathic clubfoot who were seen during a three-year period. Over a 2-year period, 200 participants were included in the trial after providing written permission. All essential patient information, including age, sex, and pre-intervention modified Pirani score, were recorded.

**Results:** 43% of the patients were aged 0-3 months, 31% were aged 3-6 months, 17% were aged 6-9 months, and 9% were aged 9-12 months. 64% of the patients were female, whereas 36% were male. Post-treatment Pirani scores significantly differed from pre-treatment scores across all age groups: 0-3 years ( $5.35 \pm 2.22$  vs.  $1.58 \pm 1.032$ ,  $p < 0.01$ ); 3-6 years ( $5.49 \pm 0.81$  vs.  $1.59 \pm 1.34$ ,  $p < 0.001$ ); 6-9 years ( $5.78 \pm 2.18$  vs.  $2.24 \pm 0.98$ ,  $p < 0.05$ ); 9-12 years ( $5.38 \pm 1.22$  vs.  $1.88 \pm 1.32$ ,  $p < 0.001$ ) were statistically significant.

**Conclusion:** The analysis found that the Ponsetti technique was very effective in treating idiopathic clubfoot, as shown by the positive outcomes on the Pirani score for clubfoot evaluation. Almost all patients showed improvement with this therapy.

**Keywords:** Club foot, modified Pirani score, Ponsetti technique, outcome of club foot

### Introduction

Talipes Equinovarus is a prevalent congenital musculoskeletal abnormality often seen by paediatric orthopaedic surgeons. It encompasses all elements of the musculoskeletal system, including bones, muscles, joints, tendons, and ligaments. The main abnormalities of clubfoot are Cavus (Medial arch curvature), forefoot adduction, hind foot varus, and ankle joint equinus. There is an aberrant connection between the Talus and Tarsal bones. The Tarsal bones are in a posture of flexion, medial rotation, and inversion, while the Talus is in a plantar flexed position<sup>[5]</sup>. These modifications result in equinus and varus of the heel<sup>[6]</sup>. The soft tissues below the knee are shortened and contracted.

The precise cause of clubfoot is not completely understood; however, several ideas suggest that both hereditary and environmental factors play a role<sup>[7]</sup>. Recent studies recognize that illiteracy and poverty contribute to the mistreatment of afflicted children, making it more challenging to address their deformities<sup>[8]</sup>. Additional risk factors include oligohydramnios, familial history, male gender, primiparity, and twin gestation. Clubfoot is a visible abnormality that does not need additional tests for discovery. However, it may be identified before birth with high-resolution ultrasound in the second trimester. There are many categories to evaluate the severity of clubfeet, with Pirani score being the most often used<sup>[9, 10]</sup>. The scale ranges from 0 to 6, with six indicating severe clubfoot and zero indicating a normal foot. It is beneficial due to its inter-observer reliability and repeatability<sup>[11]</sup>. Clubfoot was effectively treated in 90% to 98% of patients using the nonsurgical Ponseti approach<sup>[12, 13]</sup>. The aetiology of clubfoot remains unclear, with many causes including mechanical, neurological, muscular, bone, connective tissue, and vascular factors being suggested<sup>[14]</sup>. The cause of clubfoot is not well understood, with hereditary and environmental variables being suggested, but less information is available on environmental risk factors<sup>[15]</sup>. Clubfoot remains a difficulty for paediatric orthopaedic surgeons even in modern times<sup>[16]</sup>.

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Clubfoot may develop alone or be linked with various diseases, neurological disorders, and congenital deformities. Clubfoot is a significant challenge for the youngster and may reduce their quality of life. Early screening, identification, and immediate treatment are essential for developing a foot that is close to normal. The Ponseti approach transformed the treatment of congenital talipes equinovarus (CTEV) by aiming to develop a foot with a normal arch [17].

The current research aimed to evaluate the orthopaedic treatment of clubfoot at a tertiary health care facility.

### Materials and Methods

This cross-sectional research was conducted at the Department of Orthopaedics at SGRRIM&HS, Dehradun, focusing on infants under one year of age with idiopathic clubfoot who were seen in the department during a four-year period. Over a 2 years period, 200 patients were included in the trial after providing written informed permission. All pertinent patient information, including age, sex, and pre-intervention modified Pirani score, was recorded.

### Methodology

All patients received the Ponseti method for treating idiopathic clubfoot. The Ponseti procedure has two essential phases: the correction phase and the maintenance phase, including serial manipulation, casting, and tenotomy of the Achilles Tendon [19]. Next, a foot abduction brace is used to

avoid recurrence. The operations are separated into two phases: Casting Phase, which includes Manipulation, Casting, and Tenotomy. During the maintenance phase, a Foot Abduction Brace is used to avoid relapse or recurrence [19, 20]. All surgeries were conducted at our institution. Ultimately, all of them are assessed using the 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	86	43
3-6	62	31
6-9	34	17
9-12	18	9
Total	200	100
Gender		
Female	128	64
Male	72	36

The majority of the patients were in the age group of 0-3 (months) were 43%, followed by 3-6 were 31%, 6-9 were 17%, 9-12 were 9%. The majority of the patients were Female i.e. 64% and Male were 36%.

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

Age group	Pre-treatment score	Post treatment score	p-value
0-3	5.35±2.22	1.58±1.032	<i>p</i> <0.01
3-6	5.49±0.81	1.59±1.34	<i>p</i> <0.001
6-9	5.78±2.18	2.24±0.98	<i>p</i> <0.05
9-12	5.38±1.22	1.88±1.32	<i>p</i> <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 5.35±2.22 and 1.58±1.032 (*t*=8.82, *df*=72, *p*<0.01); 3-6 were 5.49±0.81 and 1.59±1.34 (*t*=12.58, *df*=56, *p*<0.001); 6-9 were 5.78±2.18 and 2.24±0.98 (*t*=9.91, *df*=26, *p*<0.05); 9-12 were 5.38±1.22 and 1.88±1.32 (*t*=10.20, *df*=24, *p*<0.001) were statistically significant.

### Discussion

Idiopathic congenital talipes equinovarus (CTEV) is a common three-dimensional foot malformation that affects about 1-2 out of every 1,000 babies. This is a prevalent and difficult musculoskeletal abnormality [21]. It signifies a developmental abnormality in musculoskeletal tissues located below the knee [22]. The soft tissues below the knee joint are all contracted. This deformity involves both inside the bone and between bone components due to an improper connection of the bones. It primarily impacts the interaction between the talus and the tarsal bones, causing these bones to adopt an excessive posture of flexion, adduction, and inversion at birth [23]. This leads to a condition characterized by equinus in the hind foot and varus in both the hind foot and forefoot [24]. Severe clubfoot deformity may significantly impact gait, leading untreated patients to walk on their ankles [4]. The global incidence ranges from 0.6 to 1.5 per 1000 births, whereas in India it is 1.19 per 1000 births [25, 26].

Indian research included 356 individuals with 402 feet affected by congenital TEV. They were treated using the Ponseti procedure, resulting in a favourable functional outcome in 95.45% of cases [27]. Ponseti clubfoot care

procedures have decreased the need for substantial soft tissue release and significant clubfoot surgery. This procedure involves using serial casting to rectify deformities, a technique that may be easily mastered by allied health practitioners. This treatment may be conducted in modest health facilities to provide benefits to the local people. Multiple seminars led by a renowned orthopaedic physician have been conducted to educate other clinicians. Researchers have varying viewpoints on the optimal age to begin therapy, but most recommend starting it as soon as possible after delivery for improved outcomes [9, 28]. 43% of the patients were aged 0-3 months, 31% were aged 3-6 months, 17% were aged 6-9 months, and 9% were aged 9-12 months. 64% of the patients were female, whereas 36% were male. Gupta A *et al.* [29] and Pulak S *et al.* [30] also reported a greater prevalence of clubfoot in men, with 81% and 80% respectively.

Post-treatment Pirani scores significantly differed from pre-treatment scores across all age groups: 0-3 years (5.35±2.22 vs. 1.58±1.032, *p*<0.01); 3-6 years (5.49±0.81 vs. 1.59±1.34, *p*<0.001); 6-9 years (5.78±2.18 vs. 2.24±0.98, *p*<0.05); 9-12 years (5.38±1.22 vs. 1.88±1.32, *p*<0.001) were statistically significant. Clinicians should avoid applying counter-pressure on the calcaneocuboidal joint while treating clubfoot to prevent treatment failure or deformity recurrence. This hinders the calcaneus from moving under the talus, a crucial motion for correcting deformities. When the three tarsal bones move simultaneously, the pressure on the calcaneocuboidal joint restricts movement in the talonavicular joint. This hinders the ability to correct the clubfoot. Applying more force to correct the deformity also results in failure to achieve

the intended outcomes. This additional strain results in discomfort and tears, leading to muscular tension in the lower extremities, which complicates manipulation and casting. The primary goal is to attain a pain-free foot with a plantigrade position and normal gait, alleviating the youngster from pain, fatigue, psychological issues, social challenges, cosmetic concerns, sports limitations, and potential work difficulties [29].

### Conclusion

Our investigation found that the Ponsetti approach was highly effective in treating idiopathic clubfoot, as indicated by the positive outcomes measured through the Pirani score assessment. The majority of patients responded well to this treatment. By conducting effective awareness campaigns and providing counselling to parents, we observed improved compliance with the treatment. We suggest that primary and secondary healthcare providers receive training in this method to alleviate the burden on tertiary care facilities and ensure that more individuals can benefit from local healthcare centres.

### Conflict of Interest

Not available

### Financial Support

Not available

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