

**Ponseti technique – Ideal for idiopathic Club foot**

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**Abstract**

**Background:** Among the number of operations for clubfoot, Ponseti technique is one of the most promising ways to correct club foot with low cost, minimum surgery and good result in short period of time. The present study was conducted to evaluate the Ponseti technique & its outcome.

**Material & Methods:** 50 cases of idiopathic clubfeet (82 feet) were enrolled from a period of May 2019 to April 2021 in the department of Orthopedics. Follow-up was done monthly for 3 months for any relapse. Parents were counselled for the strict compliance with Foot Abduction Brace.

**Results:** In present study, out of 50 subjects, majority i.e., 36 (72%) subjects came for treatment of Club foot in less than 1 month of birth, 11 (22%) subjects came for treatment of Club foot between 1-6 months of age while 3 (6%) subjects came for treatment of Club foot between 6 months-1 year of age.

Out of 50 subjects, 11 (22%) mothers had history of Previous Cesarean section, 8 (16%) mothers had Oligohydramnios.

In 20 (40%) subjects, right foot was affected, in 12 (24%) subjects, left foot was affected while in 18 (36%) subjects, both feet were affected.

In present study, out of 40 subjects in whom Tenotomy was needed & done, 37 (92.5%) (95% CI 79.6 – 98.4%) subjects had excellent results, 2 (5%) (95% CI 0.6 – 16.1%

) Subjects had good results while, 1 (2.5%) (95% CI 0.0 – 13.2%) subject had poor results. (Table 3)

Out of 40 subjects in whom Ponseti method was needed & done, it was successful in 35 (87.5%) subjects, it recurred in 1 (2.5%) subject while there was non-compliance in 4 (10%) subjects.

**Conclusions:** Ponseti method is safe & effective treatment for clubfoot. It decreases the need for extensive corrective surgery. This can be used in children up to one year of age after previous unsuccessful non-surgical treatment.

**Keywords:** Clubfoot, Idiopathic clubfoot, CTEV, Ponseti’s technique.

## Introduction

The term Talipes equino varus is derived from the Latin term Talipes. It is a combination of words “Talus” (ankle) and “pos” (foot). Equinus meaning “horse like” (the heel in planter flexion) and varus meaning inverted and adducted.<sup>1</sup>

Clubfoot, also known as congenital talipes equinovarus (CTEV), refers to a birth deformity involving 1 foot or both, in which 1 foot or both are turned into the inner side.<sup>2</sup>

Clubfoot is an embryonic & developmental malformation. It occurs in 1 in 1000 live births during the second trimester of pregnancy.<sup>3</sup>

There are 2 types of clubfoot: congenital and acquired. Congenital is further categorized into idiopathic and non-idiopathic types. Idiopathic type is characterized by single skeletal deformity. It is bilateral, late in occurrence, and responds to conservative treatment. Non-idiopathic type is characterized by diametrically opposite foot deformations, association with arthrogryposis, meningo-myelocoele or a muscular dystrophy, and poor response to conservative treatment. The acquired type occurs as a result of neurogenic and vascular causes.<sup>3</sup>

The four basic components of clubfoot are ankle equinus, hindfoot varus, forefoot adductus, and midfoot cavus.<sup>4</sup>

The goal of treatment of clubfoot is to achieve a supple, pain free and functional plantigrade foot.<sup>4</sup>

The current primary indications of surgery are resistant, relapsed clubfoot. The procedure should be customized to the patient and not an extensive release.<sup>5</sup>

Ponseti technique involves manipulation and serial casting, tendoachilles tenotomy. Later bracing to maintain correction should be done. Ponseti technique is easy to learn and is inexpensive.<sup>6</sup>

Dr. I. V. Ponseti, Prof. Emeritus University of Iowa, U.S.A. is the pioneer of manipulation and casting for the management of club foot. This technique has the advantage of low cost, minimum surgery and good results in a very short period of time if properly done.<sup>7</sup>

The Ponseti technique consists of a series of manipulations and immobilizations. It also consists of tendo-Achilles tenotomy to correct clubfoot deformities. After tenotomy, foot abduction orthosis is used to maintain the obtained correction. It also prevents recurrence. Manipulation and application of a plaster cast is done at weekly intervals. Treatment is started as soon as possible after birth. It consists of weekly manipulations and long leg casting as described by Ponseti.<sup>8</sup>

Ponseti technique has a lower complication rate, less pain and better function as the child grows. The Ponseti technique is a very safe, efficient treatment for the correction of clubfoot. It decreases the need for extensive corrective surgery. It can be used successfully in children up to 2 years of age provided no previous surgical treatment has been done.<sup>9</sup>

Ponseti method has very high success rate i.e., up to 90%.<sup>10</sup>

## Aims & Objectives

To examine the outcome of early management of clubfoot by the Ponseti method with complete percutaneous tenotomy of tendoachillis

-Its early recurrence with idiopathic congenital clubfoot.

## Material & methods

In a retrospective study, 50 neonates with idiopathic clubfoot in Varun Arjun Medical College & Hospital, Shahjahanpur, U.P., India were evaluated. Medical records from January 2019 to December 2020 were checked.

**Inclusion criteria**

- Neonates & infants of Club foot up to 1 year of age and both genders
- Parents who were willing to participate in the study

**Exclusion criteria**

- Infants with Club foot over 1 year of age
- Neonatal drop foot
- Postural clubfoot
- Relapse cases, and syndromic cases like myelomeningocele, arthrogryposis, and cerebral palsy).
- Parents who were not willing to participate in the study.

Parents were given necessary information about the treatment technique, outcomes, complications, duration, and visits. Informed written consent to participate in the study was obtained from them. Data on the neonate’s & infant’s age, gender, education of parents, family history, and compliance of family with a brace were collected.

During the first 3 weeks of treatment by the Ponseti method, casts were applied for each Club feet once a week & till the correction of the varus of the foot was achieved. Percutaneous tenotomy of tendoachillis was performed whose equinus was not corrected. After application of casts for 6 weeks, the maintenance phase started. Foot abduction braces (Dennis brown splint) were applied for all infants 24 hours per day for 3 months. Then, the patients wore foot abduction braces only during the night. They received physiotherapy during the day for 1 year. Infants were given special walking shoes once they started walking. They wore foot abduction braces over the night till 5-6 years.

The collected data was analyzed using the SPSS, STATA version 10.1, 2011.

**Results**

Table 1: Demographic characteristics of study subjects

Demographic characteristics	No. of subjects	Percentage
Age		
<1 month	36	72%
1-6 months	11	22%
6-12 months	3	6%
Sex		
Males	31	62%
Females	19	38%
Family history	9	18%

In present study, out of 50 subjects, majority i.e., 36 (72%) subjects came for treatment of Club foot in less than 1 month of birth, 11 (22%) subjects came for treatment of Club foot between 1-6 months of age while 3 (6%) subjects came for treatment of Club foot between 6 months-1 year of age.

31 (62%) subjects were males while 19 (38%) were females. 9 (18%) subjects had family history of Club foot. (Table 1)

Table 2: Factors affected

	No. of subjects	Percentage
Previous Cesarean section	11	22%
H/o Oligohydramnios	8	16%
Foot affected		
Right	20	40%
Left	12	24%
Bilateral	18	36%

In present study, out of 50 subjects, 11 (22%) mothers had history of Previous Cesarean section, 8 (16%) mothers had Oligohydramnios.

In 20 (40%) subjects, right foot was affected, in 12 (24%) subjects, left foot was affected while in 18 (36%) subjects, both feet were affected. (Table 2)

Table 3: Results of Tenotomy

Results of Tenotomy	No. of subjects	Percentage	95% CI
Excellent	37	92.5%	79.6 – 98.4%
Good		5%	0.6 – 16.1%
Poor	1	2.5%	0.0 – 13.2%

In present study, out of 40 subjects in whom Tenotomy was needed & done, 37 (92.5%) (95% CI 79.6 – 98.4%) subjects had excellent results, 2 (5%) (95% CI 0.6 – 16.1%) Subjects had good results while, 1 (2.5%) (95% CI 0.0 – 13.2%) subject had poor results. (Table 3)

Table 4: Status of study subjects by Ponseti method

Status of study subjects	No. of subjects	Percentage	95% CI
Successful	35	87.5%	73.3 – 95.8%
Recurrence	1	2.5%	0.0 – 13.2%
Non-compliance	4	10%	2.8 – 23.7%

In present study, out of 40 subjects in whom Ponseti method was applied, it was successful in 35 (87.5%) (95% CI 73.3 – 95.8%) subjects, it recurred in 1 (2.5%) (95% CI 0.0 – 13.2%) subject while there was non-compliance in 4 (10%) (95% CI 2.8 – 23.7%) subjects. (Table 4)

Table 5: Complications

Complications	No. of subjects n=40	Percentage	95% CI
Oedema feet	4	10%	2.8 – 23.7%
Ulceration	2	5%	0.6 – 16.1%
Necrosis	1	2.5%	0.0 – 13.2%

In present study, out of 40 subjects in whom Ponseti method was applied, 4 (10%) (95% CI 2.8 – 23.7%) Subjects had edema feet, 2 (5%) (95% CI 0.6 – 16.1%) Subjects had ulceration due to casting while 1 (2.5%) (95% CI 0.0 – 13.2%) subject had necrosis. (Table 5)

### Discussion

In present study, out of 50 subjects, majority i.e., 36 (72%) subjects came for treatment of Club foot in less than 1 month of birth, 11 (22%) subjects came for treatment of Club foot between 1-6 months of age while 3 (6%) subjects came for treatment of Club foot between 6 months-1 year of age.

31 (62%) subjects were males while 19 (38%) were females. 9 (18%) subjects had family history of Club foot. (Table 1)

Syed AHK et al found that 50% of infants were less than 1 month of age, the youngest infant was of 10 days and the oldest infant was of 9 months of age at the time of initial consultation. Majority i.e., 83.33% of infants were males.<sup>11</sup>

In present study, out of 50 subjects, 11 (22%) mothers had history of Previous Cesarean section, 8 (16%) mothers had Oligohydramnios. In 20 (40%) subjects, right foot was affected, in 12 (24%) subjects, left foot

was affected while in 18 (36%) subjects, both feet were affected. (Table 2)

Syed AHK et al found that 18 60% subjects had bilateral clubfoot, 12 infants had right side clubfoot while 10 subjects, left side was more commonly involved. 63.33% of children were cesarean births with most of them having history of oligohydramnios.<sup>11</sup>

In present study, out of 40 subjects in whom Tenotomy was needed & done, 37 (92.5%) (95% CI 79.6 – 98.4%) subjects had excellent results, 2 (5%) (95% CI 0.6 – 16.1%) Subjects had good results while, 1 (2.5%) (95% CI 0.0 – 13.2%) subject had poor results. (Table 3)

Ponseti I et al found that in 71% of the feet, results were good. In 28%, a slight residual deformity persisted. In one foot a poor result was obtained.<sup>12</sup>

Madhuchandra P et al found that in group I, 100% good correction of CTEV deformity was seen by casting alone. In group II, 50% good results & 50% fair results were seen. In group III, 71.3% good results, 21.2% fair results and 7.5% unsatisfactory results were seen. In group IV, 27.3% good results, 30.3% fair results and 42.4% unsatisfactory results were seen.<sup>13</sup>

In present study, out of 40 subjects in whom Ponseti method was applied, it was successful in 35 (87.5%) (95% CI 73.3 – 95.8%) subjects, it recurred in 1 (2.5%) (95% CI 0.0 – 13.2%) subject while there was non-compliance in 4 (10%) (95% CI 2.8 – 23.7%) subjects. (Table 4)

Shinde et al found that with the Ponseti method, out of 48 feet, 42 feet required tenotomy. In only 06 (12.5%) feet tenotomy was not performed. 10 (20.83%) feet had a relapse of their deformity after initial successful treatment. The splint compliance was compromised in these cases. In 5 cases of relapse, the Denis Browne splint was not used according to the protocol. In 2 cases

the shoes were poorly fitting. Out of the 10 cases of relapse, 3 were successfully treated by manipulation and recasting. 2 feet required a second tenotomy of the tendo Achilles while 3 (6.25%) feet underwent a posterior release. 2 (4.16%) feet required a complete posteromedial soft tissue release (PMR).<sup>14</sup>

Khorsheed MA et al found that clubfoot recurred only in 2(6.7%) subjects, Noncompliance with the treatment was seen in 2(6.7%) subjects. The treatment of clubfoot by Ponseti method with complete percutaneous tenotomy of tendoachillis was successful in 26(86.6%) subjects.<sup>15</sup>

In present study, out of 40 subjects in whom Ponseti method was applied, 4 (10%) (95% CI 2.8 – 23.7%) Subjects had edema feet, 2 (5%) (95% CI 0.6 – 16.1%) Subjects had ulceration due to casting while 1 (2.5%) (95% CI 0.0 – 13.2%) subject had necrosis. (Table 5)

Mahajan N et al found that one patient developed necrosis of dorsum of both feet at anterior part of the head of the talus. This patient was treated conservatively by dressing. Plaster ulceration in thigh and oedema of feet was observed in three and five feet respectively. This was treated by dressing and foot elevation. Loose cast application for 2-3 weeks was done.<sup>16</sup>

### Conclusion

Ponseti method with a complete percutaneous tenotomy of tendoachillis is an effective technique to correct clubfoot particularly if it is performed during the initial weeks of life. The success rate in this study was 87.5%.

### Limitations

- Retrospective study
- Small sample size
- Short follow-up period of 2 years to assess the recurrence

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