

ORIGINAL RESEARCH

To evaluate the success rate of idiopathic clubfoot management by ponseti technique under 2 years age group, and to determine the cause of relapse

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ABSTRACT

Introduction: Congenital talipes equinovarus (CTEV), also known as clubfoot, is common congenital orthopedic foot deformity in children characterized by four components of foot deformities: hindfoot equinus, hindfoot varus, midfoot cavus, and forefoot adduction. Ponseti method has become the mainstay of congenital clubfoot treatment in children presenting at early age. The initial efficacy rate of Ponseti method reaches almost 100%. The Pirani method of evaluating the deformity and treatment outcome is easy and fairly reproducible and corresponds to the functional outcome of the treated feet.

Purpose: To evaluate the success rate of ponseti technique in management of idiopathic clubfoot, in children up to 2 years of age and to determine relapse percentage during follow up. **Methods:** This is a prospective study conducted at the Orthopaedic Surgery units of IGGGH & PGI, Pondicherry with idiopathic club foot aged from 7days to 2 years between June 2014 to May 2016 (two years) and includes 30 childrens having idiopathic Clubfoot, corrective cast application at weekly interval as per Ponseti protocol and were assessed with Pirani scoring system. **Results:** In this study, overall 90% of the patients (36 out of 40 feet) showed excellent to good outcome (successful result) after 18 months of follow up. Patients presenting earlier in this study (<7 months) showed excellent results. About 3 (10%) had poor results as they showed relapse, relapses were seen in noncompliance group. **Conclusion:** Ponseti Method is an excellent conservative method for treatment of Congenital Talipes Equino Varus (CTEV) deformity. Treatment must be started as earlier as possible. Maintenance of the corrected deformity with molded orthosis is as important as deformity correction, parent motivation & compliance is very important for successful management of the deformity

Keywords: Clubfoot, Ponseti method, Pirani score

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INTRODUCTION

Clubfoot is a complex deformity occurring in an otherwise normal child or as a part of many prenatal disorders. It has four components: equinus, varus, adductus and cavus. The goal of treatment is to correct all components of the deformity so that the patient has a pain free plantigrade foot with good mobility, without calluses, and without the need to wear modified shoes(1).

Most investigators have reported an incidence of 1-2 per 1,000 live births. The incidence in India being 0.9 per 1,000 live births and the prevalence being 1.29 per 1,000. A sex ratio of 2-2.5 males per female. All investigators have reported that more than 50% cases are bilateral. In unilateral cases, right foot having a slight preponderance (2) (3).

The Ponseti method for treatment of idiopathic clubfeet involves the use of serial casts, percutaneous Achilles tendon tenotomy in most cases and bracing with an abduction orthosis to prevent relapse (4).

Ponseti method is a sensible approach based on better understanding of the functional anatomy of the clubfoot and takes advantage of the logical response of young connective tissue and bone to manipulation and corrective casting.

Subsequently various methods of deformity evaluation and treatment monitoring were developed. Pirani scoring system is clinical based, easy to apply and is fairly reproducible with minor inter-observer variability.

MATERIALS AND METHODS

This is a prospective study conducted at the Orthopaedic Surgery units of IGGGH & PGI, Pondicherry with idiopathic club foot aged from 7days to 2 years between June 2014 to May 2016 (two years) and includes 30 childrens having idiopathic Clubfoot, corrective cast application at weekly interval as per Ponseti protocol and were assessed with Pirani scoring system.

INCLUSION CRITERIA

1. New born babies and children between 7 days to 2 year of age with idiopathic club foot.

2. Unilateral and bilateral cases.

EXCLUSION CRITERIA

1. Non-idiopathic clubfoot like neuropathic clubfoot, syndromic clubfoot, postural clubfoot, metatarsus adductus.
2. Age more than 2 years.
3. Patients that have undergone prior surgical intervention for clubfoot

Children were evaluated and graded for severity of clubfoot by Pirani severity scoring system

Table (5): Pirani score, (hindfoot) (5).

"LOOK"	0	No heel crease
Posterior	0.5	Mild heel crease
Crease	1	Deep heel crease
"Feel"	0	Hard heel (calcaneum in normal position)
Empty	0.5	Mild softness
Heel sign	1	Very soft heel (calcaneum not palpable)
"Move"	0	Normal dorsiflexion
Rigidity of equinus	0.5	Foot reaches plantigrade with knee extended
	1	Fixed equines.

Table (6): Pirani score, (midfoot) (5).

"LOOK"	0	No deviation from straight line
Lateral border of foot	0.5	Medial deviation distally
	1	Severe deviation proximally
"FEEL"	0	Reduced talo-navicular joint
Talar head	0.5	Subluxed but reducible talonavicular joint
	1	Irreducible talo-navicular joint
"MOVE"	0	No medial crease
Medial crease	0.5	Mild medial crease
	1	Deep crease Altering contour of foot

PONSETI METHOD

The procedure described by Ponseti (1-2) can be divided into two phases-

1. Treatment phase which consists of manipulation, casting and tenotomy.
2. Maintenance phase which is use of foot abduction brace to prevent relapse or recurrence.

Gentle manipulation and casting are done weekly. The order of correction by serial manipulation and casting should be as follows: first, correction of forefoot cavus and adduction; next, correction of heel varus; and finally, correction of hind foot equinus. Correction should be pursued in this order so that a rocker-bottom deformity is prevented by dorsiflexing the foot through the ankle joint rather than the midfoot. The first cast application corrects the cavus deformity by aligning the forefoot with the hindfoot, supinating the forefoot to bring it in line with the heel, and elevating (dorsiflexing) the first metatarsal. The casts should be applied in two stages: first, a short leg cast to just below the knee, then extension above the knee when the plaster sets. During these manipulations, the navicular can be felt reducing over the talar head by a thumb placed on the head of the talus. It is crucial that forefoot derotation occur about the talus rather than the calcaneocuboid joint and the heel should not be directly manipulated.

The final cast is applied with the foot in the same maximally abducted position and dorsiflexed 15 degrees. This was often aided by percutaneous tenotomy of tendoachilles as an OPD procedure. The foot is cast in the final position of approximately 70 degrees of abduction and 15 degrees of dorsiflexion for 3 weeks.

MAINTENANCE PHASE

When the final cast is removed, the infant is placed in a Steenbeek Foot Abduction Brace that maintains the foot in its corrected position (abducted and dorsiflexed). The Steenbeek Foot Abduction Brace (foot abduction orthosis) consists of shoes mounted to a bar in a position of 70 degrees of external rotation and 15 degrees of dorsiflexion. The distance between the shoes is set at about 1 inch wider than the width of the infant's shoulders. (6)

Patients were evaluated every 15 days until the age of six months, and then every month after initial completion of treatment to encourage parental compliance to bracing and to evaluate maintenance of correction and any early signs of recurrence.

RESULTS

Treatment was begun at less than six months of age in 23 cases (77%). In rest of the cases, treatment was initiated at more than 6 months of age.

Male predominated the series consisting about 67% of the population. The male to female ration in the series was 2:1.

In 30 cases, twenty (66%) had unilateral and ten (34%) had bilateral involvement. Right side was found to be

more commonly involved (43%) in unilateral cases when compared to left (23%).

Foot was classified into supple type, if manual reduction was possible; and rigid type, where manual reduction was impossible. By this method, 87% feet were rated as supple and 13% as rigid, at time of initial presentation.

Patients presenting early after birth required lesser number of casts compared to those who presented late. The mean number of casts that were applied to obtain correction was. 6.8 (range- 4 to 14 casts).

The more severe the initial deformity (Higher Pirani Score), the more casts were required to obtain correction.

87% of patient under treatment showed good compliance to Foot abduction brace, 3 (10%) relapses were seen in noncompliance group. There were 4 complications among all the casting performed, constituting 10% of total feet. The commonest complication was minor abrasions seen in young neonates which may be due to soft skin.

In this study, overall 90% of the patients (36 out of 40 feet) showed excellent to good outcome (successful result) after 18 months of follow up. Patients presenting earlier in this study (<7 months) showed excellent results

DISCUSSION

A clinical study on one of the most common congenital deformity of foot i.e. congenital talipes equino varus was carried out in Department of Orthopaedics, IGGGH & PGI, Pondicherry, to evaluate the success rate of ponseti technique in management of idiopathic clubfoot, in children up to 2 years of age.

In total, there were thirty childrens (forty feet) treated by Ponseti technique.

A large proportion of patients were seen very early in life. The youngest patient who was included in this study was 8 days old and eldest was 1year 10 months. 25 patients (33 feet) were below 1 year age group and there mean age at presentation was 10.9 weeks excluding last 5 cases whose age were 1year or more.

Dobbs et al. who reported clubfeet in 51 patients observed mean age of 12 weeks, at initial presentation (7).

In my study there were 20 males and 10 female children that are 66.7% and 33.3% respectively.

RajuRijal et al. in his series reported 66.2% males and 33.8% females (8).

As regard laterality, 10 of our cases were bilateral (33%) and 20 were unilateral (67%) (13 right and 7 left sided) which is in concordance with other series presented by, **Wyne Davis** (44% bilateral and 56% unilateral) (9).

In my study, I used Pirani scoring system which is in accordance with **Lehamn et al.** series, which shows Pirani scoring is easy to use and simple and fairly reproducible (.119) Overall mean Pirani Score of 4.9

was recorded for all feet. Similarly mean Pirani Score of 4.6 was noted by **Lehman et al.** (10).

In my study, number of casts required for full correction ranged from 4 to 14 and patients requiring mean number of 6.8 casts. **Noam Bor et al.** in their series had mean total Pirani score 4.7 (2 to 6) and mean number of cast required was 6 similar to our study (11).

Mean post tenotomy pirani score during final follow up was 0.25.

This value was compared with initial Pirani score using “paired t test”, which showed P value less than 0.0001. By conventional criteria, this difference is considered to be extremely statistically significant.

In **Md Saif Ullah et al.** series mean post-treatment Pirani score of the study group was: 0.36 ± 0.43 similar to our study (12).

Compliance with the foot abduction brace has also been an issue. Those patients compliant with foot abduction brace wear had 87% success at final last follow-up. However patients not compliant with FAB wear, with initial good results after casting, had maintained correction in only 25% of the patients. Among 4 noncompliance group, 3 were mainly due to poor education level of parents and one due to poor fitting brace.

In the present series 10% of the patients (3 children) reported relapses after initial successful treatment. In **ponseti** series rate of relapse was seven percent in compliant patients, compared to 78 percent in non-compliant patients (13).

There were 4 feet which had complications among all the casting performed, constituting 10% of total feet. The commonest complication (2 out of 4 feet) was minor abrasions seen in young neonates which may be due to soft skin. One had blister formation and one had loosening of cast. **Morcuende et al.** reported low incidence of complication (in 12 cases i.e. 8%) which included erythema, slight swelling of the toes, or downward slippage of the cast (14).

In this study, overall 90% of the patients (36 out of 40 feet) showed excellent to good outcome (successful result) after 18 months follow up.

Patients presenting earlier in this study (<7 months) showed excellent results.

10% of patients (4 out of 40) showed poor outcome as they showed relapse.

In **Bor N, Coplan JA, Herzenberg JE** series, the Ponseti method proved successful with 89.2% of feet (99 feet) achieved a good outcome (15).

CONCLUSION

Ponseti Method is an excellent conservative method for treatment of Congenital Talipes Equino Varus (CTEV) deformity. Treatment must be started as earlier as possible. Maintenance of the corrected deformity with molded orthosis is as important as deformity correction, parent motivation & compliance

is very important for successful management of the deformity.

This study has some limitations such as this study includes only children with less than two years old. Therefore, this study does not include clubfoot children with more than two years old, neglected clubfoot with using the Ponseti method. In the future study, it is recommended that to do more literature search on databases to review the neglected clubfoot, clubfoot with other abnormalities, more randomized control studies with using Ponseti method and other interventions

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