

## Correction of Congenital Talipes Equino Varus by Ponseti Method

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### Key words

Ponseti technique-manipulation and casting, foot abduction brace-prevention of recurrence, percutaneous tenotomy-correction of equinus deformity.

### ❖ Abstract ❖

Clubfoot is one of the commonest congenital anomalies. Though various modalities of treatment are available for this common disorder ranging from surgical release, distraction by external fixator to conservative methods, none has proved to be a standard for treatment. A study of 58 cases [76 feet] of clubfoot treatment was done at Sassoon General Hospital by Ponseti method of manipulation and casting.

A detailed clinical history and examination was done for each patient. Serial manipulation and casting of deformed feet done every week for 5-7 weeks [average 6.2 casts / feet] . Cavus was corrected in first manipulation followed by forefoot adduction and heel varus in subsequent manipulation until a abduction of 60-70 degree is achieved. It was followed by correction of equinus by TA tenotomy[80% feet]or manipulation and casting[20 % feet].The correction was held in corrected position in STEENBEEK FOOT ABDUCTION BRACE- to be worn full time for 3 months and 14-16 hrs/day until the age of 3-4 yrs. Pre treatment assessment of severity and correction of deformity during the period of manipulation and casting was done by Pirani score.

Post treatment evaluation of results was divided into 3 categories- good, acceptable and poor. 71% feet had good result, 26% had acceptable and 3% had poor result. 31% feet had relapse of deformity ranging from mild to severe and it was mostly due to non-compliance to postcasting bracing protocol and treated mostly by remanipulation and casting. The results were compared with Ponseti's result and found to be comparable [78% versus 71% good to excellent results]

The Ponseti method of correction of clubfoot is a safe and effective treatment and radically decreases the need for extensive corrective surgeries and achieves functional, pain free, normal looking, plantigrade feet, with mobility and without calluses and required no modified shoes.

### Introduction

Clubfoot or CTEV is one of the commonest congenital anomalies with incidence of 1/1000 live births. Review of literature reveals various modalities of treatment like-

1. Serial manipulation and casting [e.g., Kite's method]
2. Surgical release of soft tissue contracture [e.g., Turco, Cinciati, Mc Kay]
3. Gradual distraction by external fixator [e.g., JESS, Illizarov]

Several surgical methods were tried but the results have not proven to be superior and complication have been reported after surgery.

DR.I.V. Ponseti, Prof. Emiruts University of Iowa, U.S.A. has been the pioneer of manipulation and casting for the management of this problem. He first published his article in J.B.J.S. in 1965. But the orthopaedic community ignored his results till 1995 when he published his results with 35 yrs of follow-up-the longest follow up in this field. This technique is gathering momentum all over the world due to its advantage of low cost, minimum surgery and good results in a very short period of time if properly done.

Here we present a prospective study of correction of CTEV by Ponseti method of manipulation and casting.

### **Materials & Methods**

#### **Case selection :**

- Total no.58 patients (76 feet) from Jan 2002 to Jan 2005 from ortho opd and indoor pts at SGH, Pune.
- Pt with clubfoot upto one yrs of age irrespective of their previous treatment.

#### **Materials**

- **For casting :** POP bandage and cotton roll.
- **For tenotomy :** lignocaine 2% soln, sterile syringe and needles, 15 no. surgical blade.
- **For maintenance of correction:** STEEN-BEEK foot abduction splint.

#### **Methods**

- Detailed clinical history.
- Detailed clinical examination.
- Manipulation.

#### **Ponseti Technique**

• Serial manipulation and weekly casting for 4 -5 casts ( more if necessary ) followed by percutaneous tenotomy of TA tendon.

• 1st cast: correction of Cavus by elevating 1st metatarsal. The cause of cavus deformity is relative pronation of forefoot in comparison to hind foot due to planter flexion of first metatarsal. The aim of first manipulation is to align the forefoot to hindfoot & this is achieved by supinating forefoot, elevating first metatarsal and applying toe to groin cast.

• Subsequent cast: forefoot is abducted by one hand holding first metatarsal and first cuneiform keeping counter pressure over head of talus by the thumb of other hand which acts as fulcrum. Correction is held for 60 sec. and then released. This is repeated a few times.

#### **Casting**

After adequate manipulation POP cast is applied over cotton padding and molding is done over head of talus, over the heel and over plantar aspect of metatarsal. While foot is held in corrected position, below knee cast is applied first which is converted into above knee after molding is over.

#### **Percutaneous Tenotomy**

This was required to correct equinus deformity & was required in 80% of our patient.

• Done under LA. Mother is allowed to stay and breast feed the baby. This procedure is done when

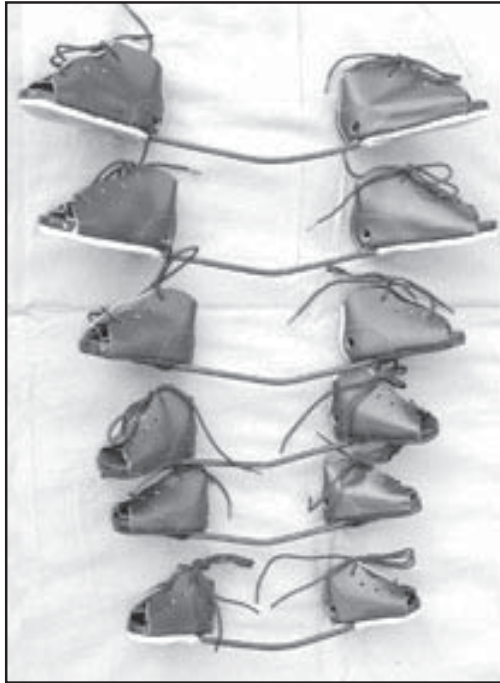
- Abduction of 60° of foot is achieved.
- MFC score of Pirani is 0.

• Additional 10-15° of dorsiflexion is achieved.

• AK cast is applied with foot in fully corrected position- 60-70 degrees of abduction & 10-20 degrees of dorsiflexion. This cast is kept for 3 weeks and after 3 weeks cast is removed and Steenbeek foot abduction brace is applied immediately.

#### **The Steenbeek Foot Abduction Brace**

- Maintains correction.
- 3 months full time.
- 2-4 yr. night time.
- Bar as wide as shoulders.
- Externally rotate 70 degrees.
- Dorsiflex 10-15 degrees.
- Heelcup.
- Failure to wear is the most common cause of recurrence.



**Follow Up :** Post bracing follow up was done at monthly interval for threemonths, then three monthly for one year and six monthly thereafter. At each visit patient was examined clinically for any relapse.

### Results

Pretreatment & intratreatment evaluation of result was done with PIRANI SCORE.

- Pirani score is ideal,
- Objective & easy to use
- Helps to document ongoing correction.
- No tenotomy till mid foot contracture [MFC] score is 0.

(A) A Total Score (TS) of up to 6 (0 = normal, 6 = severe deformity).

(B) A Midfoot Contracture Score (MFCS) of up to 3 (0 = normal, 3 = severe deformity)

(C) A Hindfoot Contracture Score (HFCS) of up to 3 (0 = normal, 3 = severe deformity)

### Components of HFC (Hind foot contracture) :

**1. Posterior crease :** It is present just above heel pad. Deep-1, shallow-0.5, absent-0

**2. Empty heel :** If calcaneal tuberosity is – not palpable-1, palpable with difficulty-0.5, easily palpable-0.

**3. Rigid equines :** If the equinus is rigid and cannot be corrected upto neutral position-1, upto neutral-0.5, beyond neutral-0.

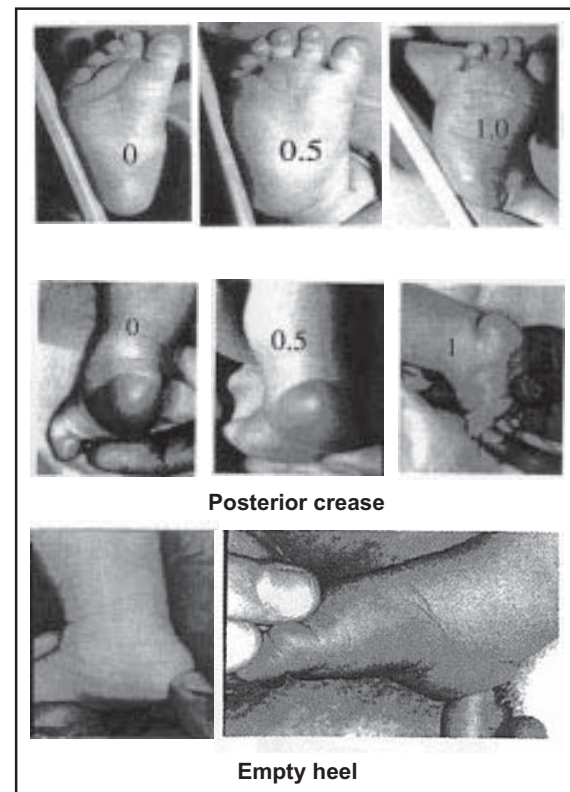
### Components of MFC [Mid foot contracture] :

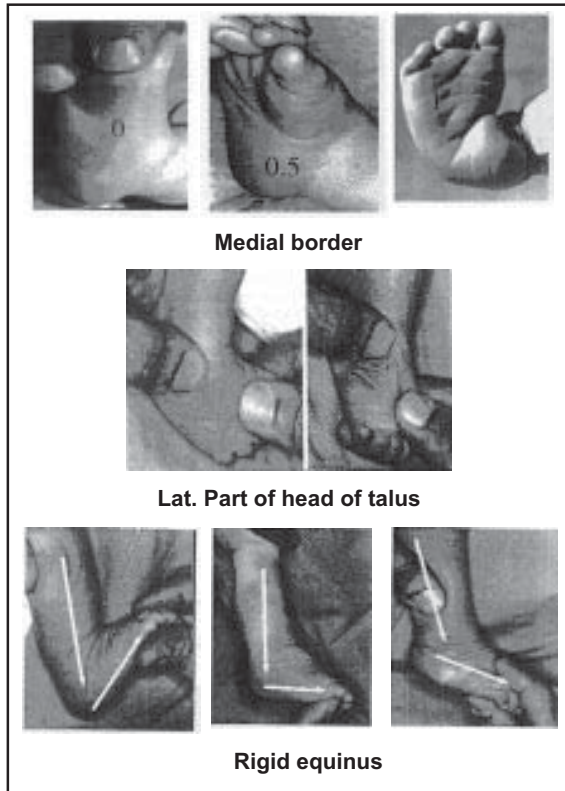
**1. Curvature of lateral border :** More than 30 degree-1, 0-30 degree-0.5, 0degree[straight border]-0

**2. Medial crease :** It is an abnormal crease preseny over medial aspect of mid foot.-deep-1, shallow-0.5, absent-0.

**3. Lateral part of head of talus :** It is amount of area of the lateral part of talus which gets covered with navicular bone when foot is held in abduction. No coverage-1, partial coverage-0.5, full coverage-0.

Assessment of correction of deformity at each visit was done with Pirani score, at each visit Pirani score should come down.





**Evaluation of Results :** Out of 58 patients, 8 were lost to follow-up. The results were analyzed in the remaining 50 patients [66 feet]. The mean follow up was 25 months with lowest being 12 months and highest being 46 months.

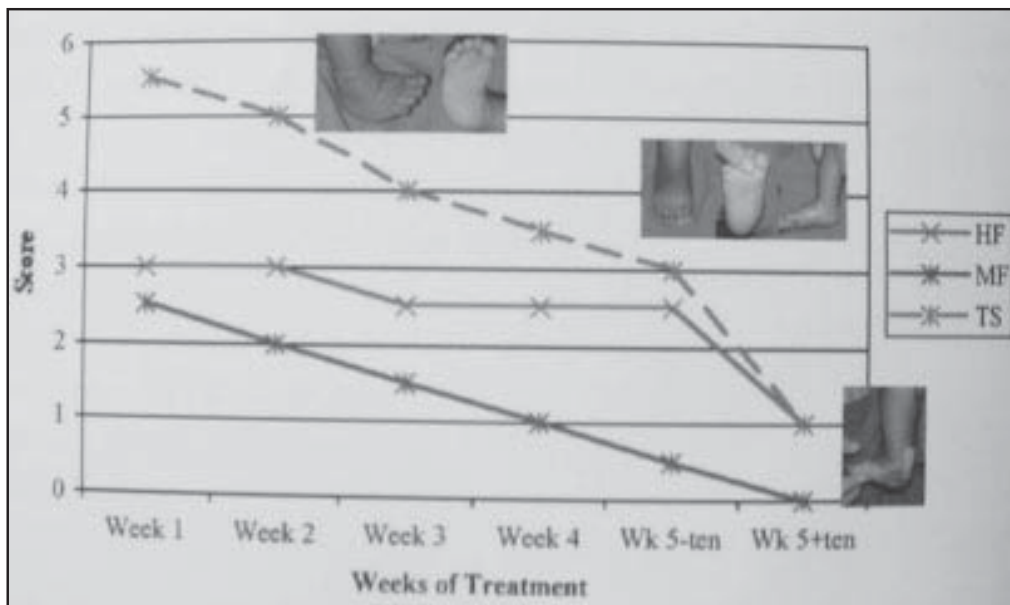
• Results have been categorised in 3 groups on the basis of 3 parameters

Ankle dorsiflexion (degrees)	Heel varus (degrees)	Adduction of forefoot (degrees)	Result
> 10	0	0-10	Good
0-10	0-10	10-20	Acceptable
< 0	Over 10	Over 20	Poor

**Analysis of results in 66 feet**

Good	47	71 %
Acceptable	17	26 %
Poor	2	3 %
<b>Total</b>	<b>100</b>	<b>100 %</b>

• **Relapse :** 20 feet (31%) had relapse, 14 treated conservatively by remanipulation & casting & bracing and 7 feet by surgery- 4 feet required transfer of tibialis anterior tendon to third cuneiform for persistent forefoot adduction and dynamic supination & 3 feet required TA lengthening for equinus deformity.



**Poadmap of Ponseti Treatment-Pirani System**

- **Major complication :** One patient, necrosis of skin of dorsum of both feet treated conservatively by dressing and had uneventful recovery.

- Minor complication in the form of plaster ulceration in thigh and edema of feet in 8 pts.

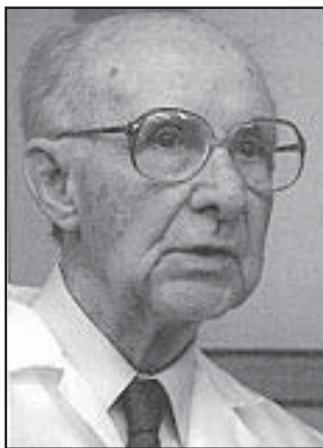
**Discussion**

Clubfoot has been recognised for its complexity and resistance to treatment since the time of Hippocrates (200 B.C). The number of operations for clubfoot are many, but the results are not encouraging and more complications are encountered after operative treatment. More over there are no long term studies supporting surgical treatment.

Most surgeons believe manipulation to be easy, however they rarely complete the treatment and abandon it and go on to surgery. Bone like young plants grow slowly and it takes many years to see the true results of procedure.

In the confusing scenario Ponseti technique is evolved and proved across the world to be one of the most promising way to correct club foot with low cost, minimum surgery and good result in short period of time.

**Dr. Ignacio Ponseti :The Pioneer**



**Published 1st Article In JBJS 1963**

His Work Went Unnoticed Till 1995 When He Published Results With 35 Yr. F/U

**Disadvantage**

The only disadvantage of Ponseti technique is strict patient compliance and regular follow up to detect early relapse which becomes difficult in our country because of lack of awareness regarding the ease of correction and high prevalence of illiteracy which can be easily overcome by inclusion of community health workers and pre treatment counselling of the parents.

**Advantages of Ponsetri Technique**

- OPD treatment
- 78% good to excellent result with 35 yr follow up
- Efficient – completes correction in 2 months
- Economical no major surgery is required.

It is safe and effective treatment for clubfoot and radically decreases the need for extensive corrective surgery. This technique can be used in children upto one yr of age even after previous unsuccessful non-surgical treatment.

