



## THE OUTCOME OF PONSETI METHOD IN CONGENITAL TALIPES EQUINOVARUS WITH ASSIST OF PERCUTANEOUS TENDOACHILLIS TENOTOMY IN CHILDREN

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### ABSTRACT

Congenital talipes equino varus is one of the commonest congenital anomaly of lower extremity in children.

It has various deformities including cavus, adductus, varus and equinus at various level due to soft tissue contracture and bony abnormality.

This study was conducted to study the outcome of ponseti method in congenital talipes equinovarus with assist of percutaneous tendoachillis tenotomy in children. Total 270 patients entered in our study group. 30 (18 Male and 12 female) patients discontinued the treatment. 8 patients are transferred to private hospital by themselves. So the management with Ponseti technique was completed with 232 patient with affected foot 264. The detailed history and clinical examination was done. Out of the two methods of equinus correction, correction by cast application was more common among lower age and low severity. 23.53% of patients were applied with cast for correction of equinus. Percutaneous tenotomy was the method of equinus correction in 78.78% of foot. Correction of equinus by cast, in younger foot, had better proportion than in older foot with high Pirani severity score.

**KEYWORDS :** congenital talipes equino varus, Ponseti technique, Pirani score, cast, percutaneous tenotomy, posteromedial soft tissue release

### INTRODUCTION:

Congenital talipes equino varus is one of the commonest congenital anomaly of Lower extremity in children with commonest etiology being idiopathic. Incidence of idiopathic clubfoot is about 1-2 per 1000 live births<sup>1</sup>. The incidence in India being 0.9 per 1,000 live births and the prevalence being 1.29 per 1,000 live births<sup>1,2</sup>. A sex ratio of 2-2.5 males per female. The severity of the deformity may vary from very mild to completely rigid foot.

Many theories were put forward to explain the origin of clubfoot, there are several intrinsic or extrinsic factors causing clubfoot e.g. intrauterine position of the foetal, interruption in foetal development; mechanical compression or increase of intrauterine hydraulic pressure; vascular deficiencies; viral infections; muscular alterations; neurological alterations; defect in the development of bones structures and genetic defects. However, it seems that clubfoot is considered a multifactorial disease<sup>3,4</sup>. Different plans of management for correction of clubfoot are proposed which includes strapping, stretching and casting by kites and ponseti method but definitive modality to achieve the aim of functional, pain-free, plantigrade foot with good mobility, cosmetically acceptable foot and without calluses is still not found.

Nonsurgical management generally leads to inadequate correction whereas surgical management often develops extensive scarring of the soft tissue, residual pain, more stiffness and arthritis in long term. Among all treatments described, ponseti method of manipulation and serial casting is the most acceptable treatment method at present day which could show even better result with assist of percutaneous tendoachillis tenotomy.

### AIM AND OBJECTIVES:

- To study the epidemiology of Congenital Talipes Equino Varus.
- To study the corrective success rate of Ponseti method in idiopathic club foot.
- To study percentage of cases requiring percutaneous Tendoachillis tenotomy.
- To study various complication of Tendoachillis tenotomy and their percentage.

### MATERIALS AND METHODS:

#### STUDY SETTING –

The present study was conducted in Department Of Orthopaedics in a tertiary care hospital and medical college. The study was undertaken after approval from Institutional Ethical Committee.

**STUDY DESIGN** -This is prospective observational study.

#### STUDY POPULATION -

All walk outdoor patient and in door patient with clubfoot in tertiary care hospital in Department Of Orthopaedics.

#### SAMPLE SIZE-

232 patient with affected 264 feet from 01/01/2019-01/07/2020.

**Study Duration** -18 months.

#### Inclusion Criteria:

- All newborns with clubfoot deformity.
- All new as well as neglected patients with clubfoot deformity till the age of 7 years.

#### Exclusion Criteria:

- Non idiopathic clubfoot like neuropathic clubfoot, syndromic clubfoot, postural clubfoot, metatarsal adductors.

### METHODOLOGY:

After approval from the Ethics Committee and with written informed consent from relatives detailed personal history was recorded and a thorough general & local examination was carried out and Full clinical examination was done to assess the general condition of the neighboring joints and deformity was scored according to **PIRANI SEVERITY SCORING** at time of presentation and at each visit before applying cast. The score was plotted against time interval and the trend of score was noted with reference to effect of manipulations or other interventions on deformity. patient was included according to inclusion and exclusion criteria. An accelerated Ponseti method casting was followed in management of these study population which the standard weekly manipulation and change of plaster was accelerated to twice a week

manipulation and change of cast and at the end equinus deformity is corrected percutaneous tenotomy. Patients were followed up weekly for corrective casting till tenotomy. We performed tenotomy under anesthesia. All patients would be assessed with regard complications of percutaneous tendoachillis tenotomy like blood loss, nerve injury and infection etc. and postoperative functional outcome using **PIRANI SEVERITY SCORING** system. After tendoachillis tenotomy post tenotomy cast applied. The patients were started on bracing protocol with Dennis Browne splint till walking age. Patients were followed up on 1st, 2nd, 3rd and 6th month Post operatively. Result are concluded by **paired T-test**.

**TENOTOMY:**

It is an outdoor procedure.

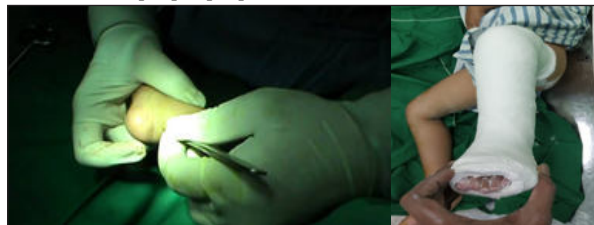
Indication- If dorsiflexion is not beyond 10° of dorsiflexion, tenotomy is indicated, provided that the adductus and varus are fully corrected.

Preparation- Prepare the family by explaining that it is an minor procedure and will be done under local anaesthesia or general anaesthesia.

Equipment- Tenotomy blade should be #11 or #15 or ophthalmic knife/tenotomy scissor, Xylocaine 2% etc.

Skin preparation- Skin preparation should be done with an antiseptic solution from mid calf to mid foot.

Anaesthesia- Xylocaine 2% is infiltrated in the region of tenotomy with sedation. The quantity should not be too much to hinder with proper palpation of tendon which looks bluish.



**Image 1** - percutaneous tendoachillis tenotomy and post tenotomy cast

Painting was done from knee to mid foot.

Draping was done keeping the ankle exposed.

The patient is in supine position while assistant holds the foot in maximum dorsiflexion, with knee flexed and thigh externally rotated foot rotated externally.

Tendoachillis was palpated and identified.

Scalpel with blade of #11 or #15 was put from medial side of tendon. The point of insertion of blade is 1.5 cm proximal to the attachment of tendo achillis on calcaneum.

By keeping the blade parallel to the tendon, to avoid the injury to the neurovascular bundle which is present anteromedial to it blade is inserted just anterior and touching to the tendon.

Now the sharp edge of blade is rotated posteriorly to cut the tendon using its tip.

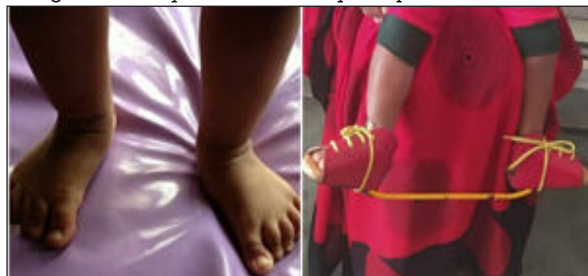
After successful tenotomy a "POP or SNAP" is felt, which gives an additional 15° to 20° of dorsiflexion.

Wound is dressed. If required stich take stich. No need of putting stiches most of the time.

Single dose of injectable antibiotic given before procedure and started with oral NSAID and antibiotic for 3 days.

**POST TENOTOMY CAST APPLICATION:**

It was applied after gaining 15° to 20° of dorsiflexion and 40°-50° of abduction and satisfactory varus correction. This cast was applied keeping the foot in 40°-50° of abduction and 15° to 20° of dorsiflexion for 3 weeks. After removal of cast, the functional outcome is check which is a painless, plantigrade with good mobility and cosmetically acceptable foot.



**Image 2**-After Treatment And Dennis-browne Splint

After the last cast was removed, correction was maintained by using Dennis-Browne splint. The brace was worn fulltime (day and night) for the first three months after the last cast was removed. After that, the child should wear the brace for 12hours at night and 2-4 hours in the middle of the day for a total of 14-16 hours during each 24-hour period. This protocol continues until the child is 3-4 years of age.

The patients were reviewed at 14 days after application of Dennis-Brown splint to assess the compliance of the parents. In subsequent visits patients were reviewed once in three months. The parents were given contact numbers and were advised to contact us regarding the maintenance of Dennis Browne splint.

Some patient have relapsed or recurrence of clubfoot and some patient are categorised as neglected clubfoot then such patient are managed by either soft tissue release procedure (<5 years old) and bony procedure (>5 years old).

**COMPLICATIONS OF NONOPERATIVE TREATMENT:**

- 1.ROCKER BOTTOM FOOT
- 2.BEAN SHAPED FOOT
- 3.FRACTURES
- 4.PRESSURE SORES
- 5.FAILURE OF CORRECTION
- 6.RELAPSE OF DEFORMITY
- 7.FLAT TOP TALUS

**RESULT:**

Total 270 patients entered in our study group. 30 (18 Male and 12 female) patients discontinued the treatment. 8 patients are transferred to private hospital by themselves. So the management with Ponseti technique was completed with 232 patient with affected foot 264.

1. mean age at presentation of all the patients were 5.1 month (153 days), with range of 0.33-18 months (10-540 days). Most frequent age at presentation was 2.0 months.
2. The minimum age at presentation for starting treatment was 10 days. The most common age at presentation was between 0-6 months, and the least common was between age >18-24 months with no patient in our study.
3. Presentation for both sexes individually is also maximum between 0-6 months. The male to female ratio is 1.9:1.0 (19/10).
4. There were 101 (38.25%) of bilateral and 163 (61.74%) unilateral cases. Among the unilateral cases there were 98 (37.12%) right and 65 (24.62%) left cases.
5. Among male, unilateral patient are 96 (63.16%) and bilateral are 56 (36.84%), the same among females are 67

(83.75%) and 13 (16.25%) respectively.

6. Mean of total number of cast applied for 264 foot to completing the study was 7.97. The average number of total cast requirement increased according to age and Pirani severity scores.

7. Average number of cast required for Pirani severity score <1.5 month was 5 and in Pirani severity score between 5.0-6.0 was 7.43.

8. For Pirani score 2.0-3.0 average number of cast required are 5 to 6, for Pirani score 3.5 to 4.5 average number of cast required are 6 to 7 and for Pirani score 5.0 to 6.0 average number of cast required are 7 to 8.

9. Equinus was corrected by cast or tendo achillis tenotomy. Out of 34 foot, tenotomy was done to 78.78% (208) foot, and cast correction was done for 21.21% (56) foot.

10. Among the tenotomised foot, 62.65% of foot were of male and rest 37.34% were of female. Among cast applied foot the male constituted 72.72% and female 27.27%.

11. Pirani severity score ranging 3.5-4.5 was the most common score among foot counting 184.

12. complications after tenotomy like superficial infection and incomplete release was 09 and 03 respectively which were treated by oral antibiotics and analgesics and revision procedure.

	Frequency	Percent
Tenotomy	208	78.78%
Cast	56	21.21%
Total foot	264	100%

	Tenotomy		Cast	
	Frequency	Percent	Frequency	Percent
Male	104	62.65%	48	72.72%
Female	62	37.34%	18	27.27%
Total	166	100%	66	100%

**DISCUSSION:**

1. In our study, the most common age range for presentation was 0-6 months. This constitutes 62.07%. The ratio of male to female in our study was 1.9:1. This similar male to female ratio was found in David A. Spiegel's study<sup>5,6</sup>. In PHarnett et al<sup>7</sup> series male to female ratio was 1:1, this study has smaller study population when compared to other studies<sup>8</sup>. However the ratio on different studies are different<sup>9,10</sup>.

2. In our study, the average age of presentation was earlier in male than female. This may be due to, that the patients coming here are more from villages and are of low socioeconomic status and with less education.

3. Patients with isolated right side clubfoot constitutes 37.12% and bilaterally clubfoot are 38.25%. Least common was isolated left sided clubfoot are 24.62%. our study shows bilateral affection of clubfoot are more than right side. In general, studies shows bilateral affection of clubfoot patients more common, as in R.A Agrawal et al's 40%<sup>11</sup>, Ankur G. et al's 37.66%<sup>9</sup>, PHarnett et al (52.5% bilateral and 47.5% unilateral)<sup>9</sup>.

4. The average number of cast application required to achieve full correction of the deformity in patients with Pirani score of 4.5 to 6.0 was 7.43 and the average number of casts required to achieve full correction of deformity in patients with Pirani score less than 4.5 are 6.3.

5. The range for number of cast applied was 5-9 in our study and the same for Ankur Gupta et al's<sup>9</sup> study, whose range was 3-10 and in study of Ponseti IV and Smoley EN<sup>12</sup>. it is 5-10. Our average number of cast application was 7.97, comparatively higher to Rebecca Kampa et al's<sup>13</sup> and Ankur et al's<sup>9</sup> study.

6. Among cast applied patients, 48 (72.72%) are male and 18 (27.27%) are female for correction of equinus. The tenotomy required by Ankur et al. was 95%. Pirani did 90% tenotomy, Laaveg et al. did 78% and Dobbs did it 91%<sup>9</sup>. So requirement of tenotomy is towards the lower side in our study.

**CONCLUSION:**

1. We conclude the Ponseti technique of clubfoot deformity correction is very effective method providing the patient with painless, plantigrade, mobile and cosmetically acceptable foot.
2. The number of cast depends on both age and mean Pirani severity score at presentation. The number of cast increases by the increase of Pirani severity score.
3. Early intervention for correction of clubfoot deformity with Ponseti technique gives excellent result like a painless, plantigrade, mobile and cosmetically acceptable foot provided the patient is compliant with follow up.
4. Ponseti method of clubfoot treatment has excellent results, with minimum surgical intervention (percutaneous tenotomy), without major complication and it is cost effective.

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