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Management of idiopathic clubfoot by ponseti method: Prospective study

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Abstract
Objective: To analyse the Functional outcome of serial cast correction of congenital idiopathic club foot by using Ponseti method.
Background: One of the most common deformity in children is club foot. It is complex deformity difficult to manage. Ponseti method used in our department of orthopaedics in Raja Muthiah Medical College, Chidambaram (Government Cuddalore Medical College, Chidambaram. We Aim to analyse management of idiopathic club foot by using ponseti method.
Methods: 22 cases selected from CTEV clinic with clubfoot were studied in the Department of Orthopaedics, Rajah Muthiah Medical College and Hospital (Government Cuddalore Medical College) Chidambaram, from March 2021 to October 2022. Detailed history regarding age, sex, mode of delivery, address and others recorded. General examination carried to rule out any other congenital anomalies. Deformity scored according to pirani scoring system. Cast changed every week, case followed up for 1 year.
Results: In 1 year follow up by ponseti method we achieved 90% excellent result 9.67% good result and <1% poor result. 90% cases required percutaneous tenotomy 9% did not required tenotomy less than 1% need posteromedial soft tissue release.
Interpretation and Conclusions: Ponseti technique is simple, safe and economical treatment for idiopathic congenital talipes equinus varus, gives excellent functional and cosmetic results without major surgery.

Keywords: Idiopathic club foot, ponseti method, pirani scoring system

Introduction
Most common deformity in lower limb is congenital club foot. But most of the cases get inadequate treatment or not get any treatment. So they lost quality of life [1].
Congenital clubfoot has 4 component, mid foot cavus, forefoot adduction hind foot equinus and varus [2, 5].
Many research has been done regarding club foot to understand pathoanatomy and to decide appropriate treatment. Treatment of club foot has been there since Hippocrates 400 BC. He is the first one to start manipulation and bandaging [7]. Nicolas Andry defined CTEV Deformity as horse hoof. Dr. H. Kite, recommended moulding and casting in the correct position for non-surgical management of club foot [4].
More study came regarding casting techniques and complications of casting includes swelling, stiffness, vacular changes in management of congenital club foot [3].
The treatment of club foot evolved with two major ideas the first is acceptance of principles of manipulation, strapping and serial casting and other favours various surgical procedures for the correction of deformity. To achieve functional, painless and anatomical foot.
1960s Dr. Ignacio Ponseti developed method of management of CTEV, starts from birth of child and based on kinematics and patho anatomy of club foot and he successfully realigned the foot anatomically with no use of extensive and major operation. This method has biomechanical basis to correct deformed ankle and foot joints. This method include manipulation, casting, tenotomy and bracing. It takes 4 to 6 weeks for correction of all components of deformity [2, 6, 8].

Ponseti method cconservatively correct all the deformity and gives excellent results but parents involvement and their education about the deformity is important to achieve successful results [9, 10, 11].

2. Methods and Materials

This study was conducted in the Department of Orthopaedics, Raja Muthiah Medical College and Hospital, Chidambaram, Tamil Nadu.

Cases were selected from CTEV clinic of the Department of Orthopaedics and the Department of Paediatrics from March 2021 to October 2022.

This patient deformity was assessed by using pirani scoring system and clinical photographs taken for every visit. Weekly casting was done after manipulation.

Manipulation followed by casting at weekly interval by ponseti technique without anaesthesia. Deformity scored according to pirani severity scoring system. This system has 6 component based on severity scored as no deformity, moderate deformity and severe deformity as 0, 0.5 and 1 respectively.

Manipulation Technique

1. **Cavus correction:** Cavus, results from forefoot pronation In relation to hind foot. Correction is done by supinating the forefoot by first metatarsal elevation. After cavus correction we can manipulate whole foot as a single unit by keeping talus as the fulcrum.
2. **Adduction, Varus and Equinus Correction:** After cavus correction other deformities are attempted for correction. Talus head identified by palpating from the lateral malleolus. Talus head used as a fulcrum than forefoot is gradually abducted simultaneously with varus correction. This corrected position held in mild pressure for a minute. This is repeated 4 – 5 times. Then above knee cast applied. Gradually tried to correct EQUINUS. If equinus correction is not adequate plan for percutaneous heel cord tenotomy.

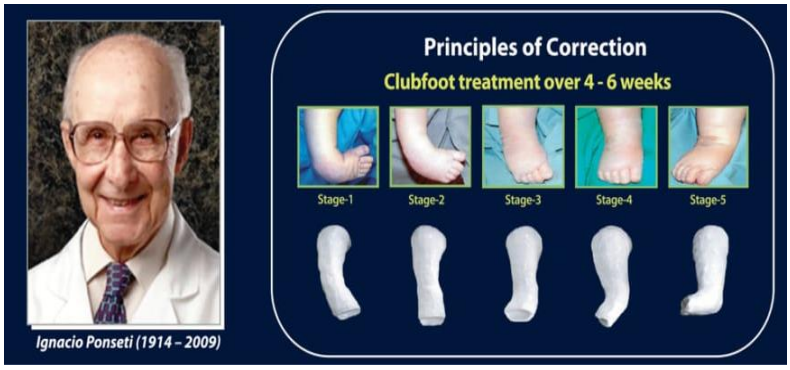


Fig 1: Manipulation Technique

Heel Cord Tenotomy

The critical point in ponseti method is to assess the correct time of heel cord tenotomy.

- MFCS was <1
- Score of lateral head of talus is 0
- Heel is in valgus
- Foot in abduction

We did heel cord Tenotomy under GA/LA.

Percutaneous heel cord tenotomy done from medial to lateral direction

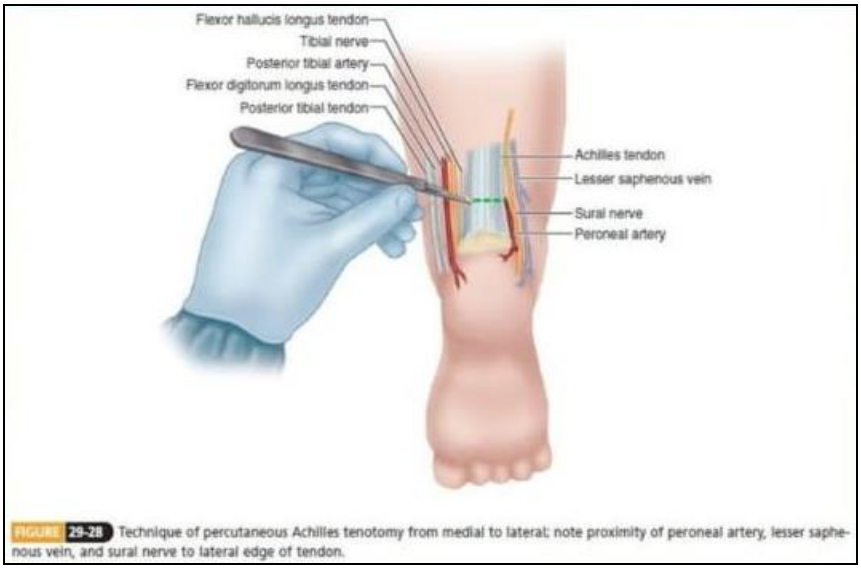


Fig 2: Heel Cord Tenotomy

Post Tenotomy Cast

After tenotomy we applied above knee final cast in 70° abduction and 15° dorsiflexion. Cast removed after 3 week brace was applied.

Bracing Protocol

Bracing used for to prevent the relapse. Brace components are,

- Two shoes attached in a single bar
- Shoe in deformity side 70° abduction and 15° dorsiflexion
- Normal side shoe on 30° abduction
- If both side affected, both shoes in 70° abduction, 15° dorsiflexion
- Distance between the shoes 1 inch wider than width of shoulder

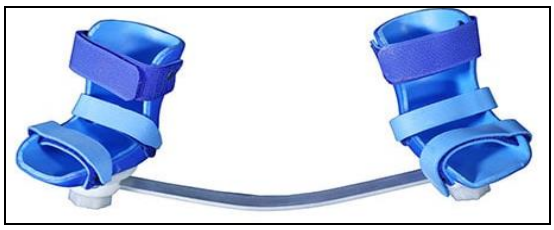


Fig 3: Denis browne splint (Brace)

Bracing Time

- 1st 3 Month 23 – 24 hrs
- After 3 Months to 4 years 12 -14 hrs

Table 1: Pirani Scoring System [7]

Parameters	Mild	Moderate	Severe
Midfoot			
Curved lateral border	0	0.5	1
Medial foot crease	0	0.5	1
Talar head coverage	0	0.5	1
Hindfoot			
Posterior crease	0	0.5	1
Rigid equinus	0	0.5	1
Empty heel	0	0.5	1
Maximum score is 6; Minimum score is 0. Higher the score, the more severe the deformity.			

Inclusion criteria

- Infants with idiopathic club foot

Exclusion criteria

- Non Idiopathic club foot
- Secondary clubfoot
- operated club foot
- Complex club foot

Results

This prospective study on most common congenital deformity of the lower limb, which is idiopathic congenital idiopathic club foot, was carried out in the department of orthopedics, Rajah Muthiah Medical College and Hospital, Chidambaram. This study includes 22 child (31 feet). The following results we observed from this study.

Table 2: Age distribution

Age distribution	No. of patient	%
<1 months	18	81.8
>1 month	4	18.1
Total	22	99.9

Table 3: Gender distribution

Gender distribution	No. of patient	%
Male	14	63.6
Female	8	36.3
Total	22	99.9

Table 4: Side of foot

Side of foot	No. of patient	%
Left	8	36.3
Right	5	22.7
Bilateral	9	40.9
Total	22	99.9

Table 5: Cast requirement

No. of cast required	No. of feet	Mean number of cast
less than 1 month	27	6.07
More than 1 month	4	8.25
Total	31	7.16

Table 6: Tenotomy requirement

Tenotomy required for correction	No. of feet	%
Yes	28	90.3
No	3	9.6
Total	31	99.9

Table 7: Requirement of PMTSR

Requirement of PMTSR	No. of feet	%
Yes	1	3.22
No	30	96.7
Total	31	99.9

Table 8: Required number of casts

Age in years	No. of patient	Mean no. of cast
<1 months	18	6
1-6 months	4	8
More than 6 months	-	-
Total	22	7

Table 9: PIRANI Score

PIRANI Score	No. of feet	Percutaneous tenotomy	
		Yes	No
1.5-2.5	4	-	4
3-4.5	20	20	-
5-6.0	7	7	-
Total	31	27	4

Table 10: Post treatment and follow up results

Post treatment PIRANI Score	No. of feet (n=31)	%
After treatment	-	
Excellent (0)	28	93.5
Good (0.5-1)	3	6.45
Poor (>1)		
1 year follow up		
Excellent (0)	29	90.2
Good (0.5-1)	2	9.6
Poor (>1)		

Case Illustration

Case 1: Kashika b/o Senthamil Selvi, Jothivel

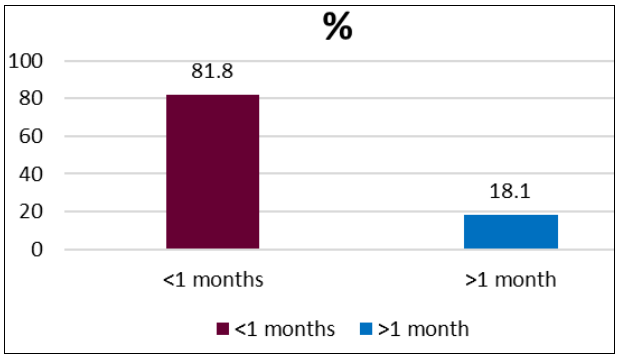
Case 2: Sivabalan b/o Mauli

4. Discussion

In this study 22 child with idiopathic club foot treated with ponseti method and followed for 1 year, from March 2021 to October 2022 at Raja Muthiah Medical College Hospital, Chidambaram.

4.1 Age

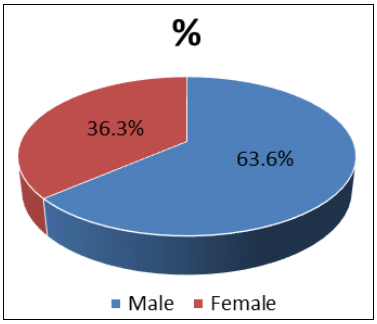
In this study more number of patients presented vary early in the age, youngest one was 7 days old, oldest was 5 months old, less than one month 18 cases(81.8%),more than one month 4 cases(18.1)(Table 2)



Graph 1: Age Distribution

4.2 Sex incidence

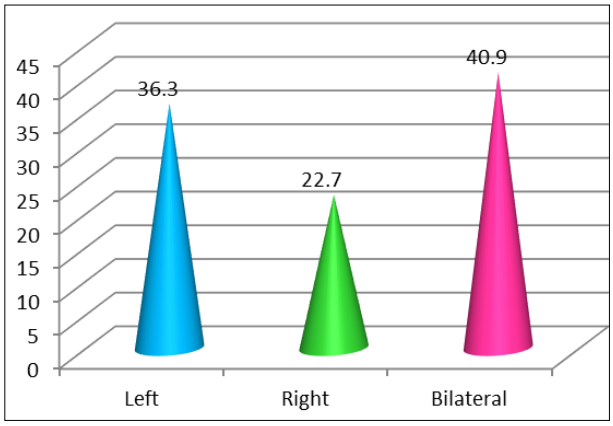
Males are more than females.Our study had males 14(63.6%), females 8(36.3%) (Table 3)



Graph 2: Sex incidence

4.3 Laterality

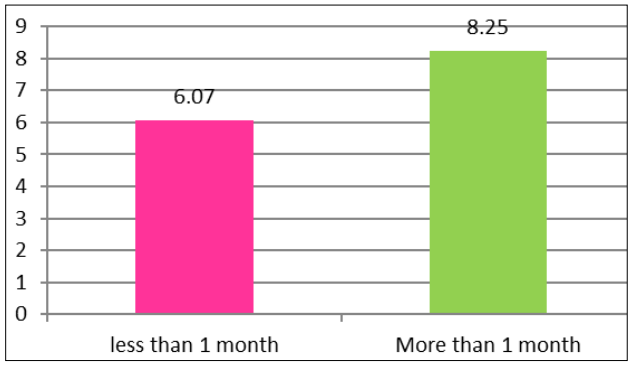
Study includes right side club feet 5(22.7%), left side feet 8(36.3%), bilateral cases are 9 feet (40.9%) (table 4)



Graph 3: Laterality

4.4 Age distribution vs cast required

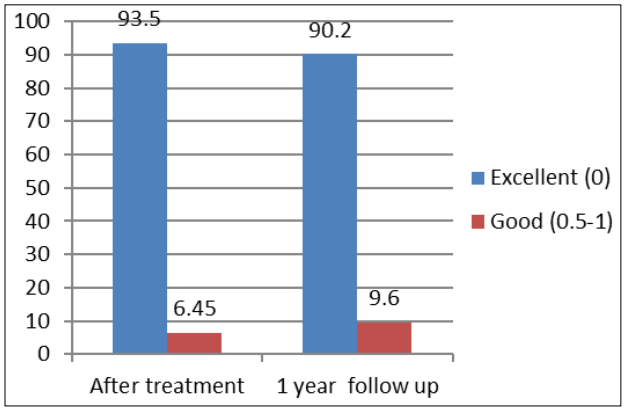
Study shows early reported cases(less than 1 month) responded well to cast, than the late reported cases (more than 1 month). Mean number of casts for less than 1 month children was 6.07 and more 1 month children required 8.25 casts (table 8).



Graph 4: Age distribution vs cast required

4.5 Post treatment score

After treatment 29 feet (93.5%) had excellent results, 2 feet (6.45%) had good results. After 1 year shows 28 feet (90.2%) excellent results and 4 feet (9.6%) shows good results (table 10)



Graph 5: Post treatment score

5. Conclusion

Treatment of idiopathic club foot by the conservative method using ponseti method gives excellent results. Ponsetti method is a conservative treatment method of the foot, it starts from day 1 of age which is based on kinematics of fundamental and pathoanatomy. This correct the club foot without major extensive operation. It gives excellent cosmetic, functional and clinical correction.

Acknowledgement
Not available

Conflict of Interest
Not available

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