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Analysis of Results by Ponseti Method In Congenital Talipes Equinovarus (CTEV)

DR RAHUL JADOO*,*Senior Resident,NC Medical College and Hospital,Panipat,Haryana,India.*
DR DITESH JAIN, *Senior Resident,NC Medical College and Hospital,panipat,Haryana,India.*
DR RAJURAM JANGID,*Senior Resident, Medical college,Barmer,Rajasthan,India.*
DR SUKHVEER KHICHAR,*Senior Resident, PDU Medical college,Churu,Rajasthan,India.*

Abstract
Background*: Incidence is approximately 1 in 1000 live births1. Bilateral deformities occurs in 50% of patients. It contains four identifiable components that are easily remembered using the acronym CAVE (cavus, adductus, varus and equinus). Ponseti method of manipulation and serial plaster casting is the gold standard treatment for idiopathic congenital clubfoot .Ponseti method provides a lower complication rate, less pain and better function as the patient ages as compared to operative treatment.*
Method: *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 hindfoot equinus. Generally five to six casts are required to correct the alignment of foot and ankle fully. Before application of the final cast, most infants require percutaneous Achilles tenotomy to gain adequate lengthening of the Achilles tendon and prevent a rocker-bottom deformity. Approximately 95% cases of CTEV require percutaneous Achilles tenotomy for correction of equinus deformity. In the maintenance phase of ponseti method; after removal of final cast, the infant is placed in a brace that maintans the foot in its corrected position(abducted and dorsiflexed).*
Result: *In this prospective study total 30 patients (46 Feet) of CTEV deformity were treated by Ponseti method and end point of casting treatment is taken as ten casts. 14 unilateral and 16 bilateral cases among 30 cases. Post casting treatment, heel cord tenotomy was done if needed and started on bracing protocol.The mean initial Pirani severity score for 46 feet was 4.52. After correction by ponseti technique, the final mean score at follow up was found to be 0.00 and the mean change in score was found to be 4.52. There were 8 females (26.70 %) and 22 males (73.30 %). The male to female ratio was 2.7:1 17 cases were bilateral (56.67%) and 13 (43.33 %) cases were unilateral. Bilateral to unilateral ratio was found to be 1.3:1. Surgical interventions needed in 14 patients out of 30 patients. Percutaneous tenotomy of tendo-achilles was done in maximum cases. The most common age group was 0– 1 months with 24 (80%) patients.*
Conclusion*: Based on above study we conclude that Ponseti method is an excellent conservative method of treatment of Congenital Talipes Equino varus. The patients who have lower Pirani score at initial presentation respond better and faster to the treatment as compared to those who have higher Pirani score at initial presentation. Treatment must start at the earliest possible for better outcome. Long term follow up till 4 years age would be better to assess the relapse rate.*
Key word: *Ponseti; Congenital;.Talipes; Equinus; Varus.*

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I. Introduction:

Congenital talipes equinovarus (CTEV) is the most common congenital foot disorder, commonly known as congenital clubfoot.Incidence is approximately 1 in 1000 live births[1].Bilateral deformities occurs in 50% of patients[2].Ponseti method of manipulation and serial plaster casting is the gold standard treatment for idiopathic congenital clubfoot[3,4].Successful correction of CTEV deformity generally is reported in more than 90% of children (2 years and younger) treated with ponseti casting even after previous unsuccessful non-operative treatment.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 hindfoot equinus.

II. Material And Methods

This is a prospective study including 30 children with idiopathic CTEV of age less than 2 years from May 2020 to December 2021 registered at SRG Hospital JMC Jhalawar, willing for treatment and with following inclusion and exclusion criteria.

Inclusion criteria:

1. All idiopathic CTEV cases.
2. Age less than 2 years.
3. Previously untreated clubfoot.

Exclusion criteria:

1. Syndromic clubfoot.
2. Relapsed clubfoot.
3. Postural clubfoot.
4. Neurological clubfoot.

Deformity was scored according to pirani severity scoring at time of presentation and at each visit before applying cast.

Pirani's method of clubfoot evaluation[5,6] Dr.Shafique Pirani had identified 6 well described clinical signs of clubfoot. Three of these signs indicate primarily hind foot contracture (HFC) and three signs indicate primarily midfoot contracture (MFC). The abnormal area on the involved foot is compared to the same area on the normal foot (if the deformity is not bilateral) and scored:-

0 = no deformity
0.5= moderate deformity
1.0= severe deformity

The foot is evaluated every week during serial cast treatment. The infant is kept supine and is examined while feeding & relaxed.

Look:
LB (Curved lateral border)
MC (Medial Crease)
PC (Posterior Crease
Feel:
HT (Lateral Head of Talus)
EH (Emptiness of Heel)
Move:
RE (Rigidity of Equinus)

Ponseti method of correction:

Initially a layer of cast padding was applied from toe to groin and the surgeon hold the foot in corrected position. The CTEV cast was applied in two stages: first, a short leg cast to just below the knee, then extension above the knee when the plaster sets. During this, the knee was held in 90 degree flexion. After application of the cast the child was observed for about 30 minutes for any signs of limb ischemia. The parents were educated about possible complications like cyanosis, swelling, excess cry and the contact number in case of emergency were provided. They were then advised to report for the next cast after 7 days. The first cast was aimed at correcting the cavus deformity by supinating the forefoot there by bringing the forefoot in alignment with the hindfoot.

Case1.**Cavus corrected by dorsiflexing inner part of forefoot.**

In the second and subsequent casts, the foot in supination was abducted while the surgeon applied counter-pressure on the head of the talus. The calcaneus abducts by rotating and sliding under the talus. Simultaneously it extends and everts there by correcting the heel varus.

Manipulation

After correction of the above deformities, passive dorsiflexion of the foot to 15 degree above neutral, a final cast was applied in the final corrected dorsiflexed position for three weeks. If dorsiflexion more than 15degrees was not possible, a percutaneous tenotomy of the tendo-achilles was done under general anaesthesia. After this tenotomy, the foot was placed in the final corrected dorsiflexed position for three weeks.

Percutaneous tenotomy

Post-tenotomy cast application

After the last cast was removed, correction was maintained by using Dennis Browne splint. The brace was worn 23 hours each day for the first 3 months after casting and then while sleeping for 3 to 4 years.

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-Brown splint.

Application of DB-splint

No heel & Outer raise border
Straight inner border

III. Results

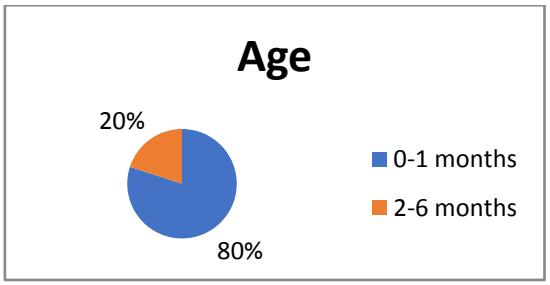
In this prospective study total 30 patients(46 Feet) of CTEV deformity were treated by Ponseti method and end point of casting treatment is taken as ten casts.

14 unilateral and 16 bilateral cases among 30 cases. Post casting treatment, heel cord tenotomy was done if needed and started on bracing protocol.

The mean initial Pirani severity score for 46 feet was 4.52. After correction by ponseti technique, the final mean score at follow up was found to be 0.00 and the mean change in score was found to be 4.52.
This was analysed by the paired t test and the p value was <0.0005 which is significant.

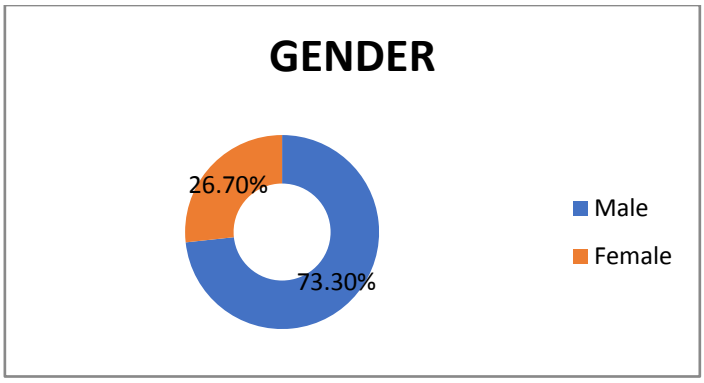
Age Incidence
The most common age group was 0– 1 month with 24 (80%) patients.

AGE	FREQUENCY	PERCENT
0–1months	24	80
1 - 6 months	6	20
> 6 months	0	0
Total	30	100



Gender incidence
Distribution of Gender

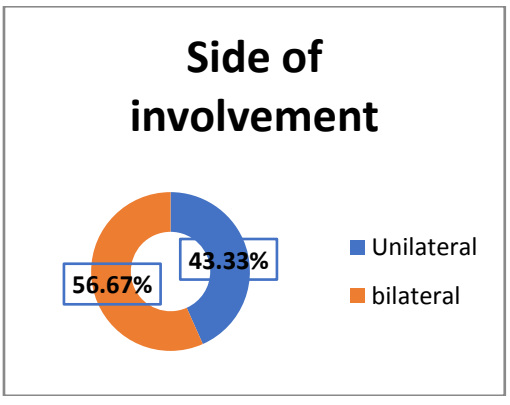
Gender	FREQUENCY	PERCENTAGE
Female	8	26.7
Male	22	73.3
Total	30	100



There were 8 females (26.70 %) and 22 males (73.30 %).
The male to female ratio was 2.7:1

Side of involvement

	FREQUENCY	PERCENT
Bilateral	17	56.67
Unilateral	13	43.33
Total	30	100



17 cases were bilateral (56.67%) and 13 (43.33 %) cases were unilateral. Bilateral to unilateral ratio was found to be 1.3:1.

Correlation between side and sex

	BILATERAL	UNILATERAL	
		Right	Left
Male	13	5	4
Female	4	1	3

Details of surgical interventions done

	Frequency	Percent
Percutaneous tenotomy	10	33.33
Z -plasty	4	13.33

Surgical interventions needed in 14 patients out of 30 patients.
Percutaneous tenotomy of tendo-achilles was done in maximum cases.

Number of Cast

No. of casts	No. of patients
4	1
5	4
6	10
7	10
8	5
Total	30

No patient has undergone extensive surgery like postero-medial soft tissue release or bony procedures to correct the deformity.

CASE IMAGES


AT PRESENTATION CAVUS CORRECTION CAST

CAST IN ABDUCTION AFTER CAST CORRECTION

TENDOACHILLES TENOTOMY & POST TENOTOMY CAST

BRACE MAINTAINENCE [D-B SPLINT]

1 YEAR FOLLOW UP

IV. DISCUSSION

Treatment of idiopathic clubfoot is either conservative or surgical. Despite long term experience in many centres, there still are outcome controversies surrounding both types of management.

Controversies persist because of lack of standards for evaluating functional outcomes, rendering comparisons between treatment groups problematic and longterm follow-up studies showing results.There were 22 male and 8 female in our series with a male to female ratio of 2.7:1. The male: female ratio in Kite's[7] series was 2.07:1 and in series of **Wyne Davis[8].**was2.17: 1.

In P.**Harnett et.al[9]** series male to female ratio was 1:1, this study has smaller study population when compared to other studies.

G.S.Vyas and Pradeep Verma(2004)[10]in their series of 43 patients had 6 patients with other congenitalanomalies with one patient having anal atresia, one patient with spinabifida, one patient with congenital dislocation of hip, one with umbilical hernia and two patients with hydrocephalus.

V. CONCLUSION

Based on above study we conclude that:

Ponseti method is an excellent conservative method of treatment of Congenital Talipes Equino varus . The patients who have lower Pirani score at initial presentation respond better and faster to the treatment as compared to those who have higher Pirani score at initial presentation. Treatment must start at the earliest possible for better outcome. Long term follow up till 4 years age would be better to assess the relapse rate.

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