A STUDY TO EVALUATE OUTCOME OF IDIOPATHIC CLUBFOOT MANAGED BY PONSETI TECHNIQUE

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ABSTRACT

BACKGROUND

Club foot is the most common congenital disorder in orthopaedics. Over the years, many different forms of treatment ranging from gentle manipulation and strapping, serial plaster corrections, forcible manipulations including the use of mechanical devices to surgical correction have been tried. Ponseti method is being used recently for treatment of club foot. The clinical correction achieved by using this method has produced a functional, plantigrade foot without requiring posteromedial release in 85% to 90% of cases.[1] Long-term follow-up studies show that feet treated by Ponseti management are strong, flexible, and pain free. These studies prove that Ponseti management of clubfoot is best for all countries and cultures.

The objective of the study is to evaluate the demographics of club foot. To assess the role of Pirani score in assessment of club foot. To study the relation between initial Pirani scores and outcome.

MATERIALS AND METHODS

In the present case series, 34 cases of idiopathic clubfoot were treated by Ponseti method and evaluated by Pirani scoring system. The cases were followed up weekly and cases which needed tenotomy were operated after other deformities were corrected.

RESULTS

Male:Female sex ratio was 2.4:1. Bilaterality in 30% of cases was seen with right-sided being slightly more common. Group 2 cases were more common than Group 1 and 3. 94% of cases required tenotomy.

CONCLUSION

Ponseti method of conservative management is very effective in treating idiopathic clubfoot. Results corelated with initial Pirani score. Tenotomy was necessary in most of the cases to correct the equinus deformity. Bracing protocol has to be strictly followed for maintenance of correction.

KEYWORDS

Club Foot, Ponseti Technique, Pirani Score.

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BACKGROUND

Club foot is the most common congenital disorder in orthopaedics. Clubfoot occurs in one in 1000 live births and is one of the most common birth defects involving the musculoskeletal system.[1] Over the years may different forms of treatment ranging from gentle manipulation and strapping, serial plaster corrections, forcible manipulations including the use of mechanical devices to surgical correction have been tried. Ponseti method is being used recently for treatment of club foot. The clinical correction achieved by using this method has produced a functional, plantigrade foot without requiring posteromedial release in 85% to 90% of cases.[2] Long-term follow-up studies show that feet treated by Ponseti management are strong, flexible, and pain free. The Ponseti treatment for clubfoot deformity was introduced in North America in the late 1940s and has become a primary treatment option in many countries more recently. The purpose of our study is to evaluate the outcome following the use of Ponseti technique for idiopathic clubfoot, to know the role of this technique in decreasing the need of surgery and to know the pitfalls of the technique if any.

MATERIALS AND METHODS

This study includes 34 patients from outpatient section of Department of Orthopaedics, ACSR Govt. medical college, Nellore. The study was done between December 2016 to August 2018. Children with idiopathic clubfoot were included in the study. Exclusion criteria: patients aged more than 2 year of age, clubfoot secondary to syndromic involvement, polio, CP and patients that have undergone prior surgical intervention for clubfoot. Demographic data (name, age, sex and date of birth of the child, educational level, and income of the parents etc.,) were obtained from the parents during

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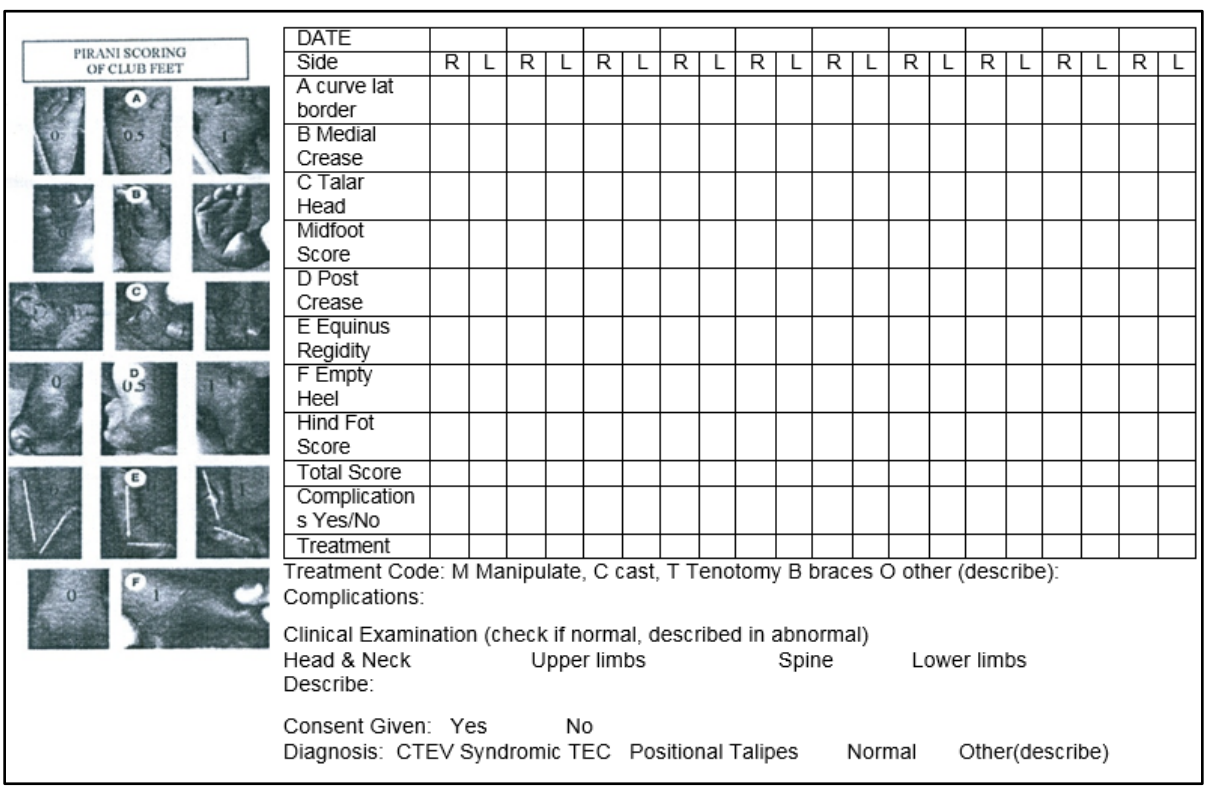
their visits. A complete and detailed history was taken in every case. Antenatal, natal and postnatal history of mother was taken to find any eventful condition during or after pregnancy. Family history for clubfoot and other congenital diseases was also inquired. Each patient was subjected through general, physical and systemic examination including spine, hip and extremities. After taking complete history, mobility of foot was assessed gentle corrective manipulation. Foot was classified into supple type if reduction was possible; and rigid type, where manual reduction was impossible. Children were evaluated and graded for severity of clubfoot by Pirani severity scoring system,[3,4] which registers the deformity of six different components of the clubfoot.

[1] Mid foot Score (MS) of up to 3 (0=normal, 3=severe deformity).
[2] A Hind foot Score (HS) of up to 3 (0=normal, 3=severe deformity).
[3] A Total Score (TS) of up to 6 (0=normal, 6=severe deformity).

Consequently, the total Score was from 0 to 6 points, with 6 representing the most severe deformity.



DATE																				
Side	R	L	R	L	R	L	R	L	R	L	R	L	R	L	R	L	R	L	R	L
A curve lat border																				
B Medial Crease																				
C Talar Head																				
Midfoot Score																				
D Post Crease																				
E Equinus Regidity																				
F Empty Heel																				
Hind Fot Score																				
Total Score																				
Complications Yes/No																				
Treatment																				

Treatment Code: M Manipulate, C cast, T Tenotomy B braces O other (describe):
Complications:

Clinical Examination (check if normal, described in abnormal)
Head & Neck Upper limbs Spine Lower limbs
Describe:

Consent Given: Yes No
Diagnosis: CTEV Syndromic TEC Positional Talipes Normal Other(describe)

Figure 1. Pirani Score

Every clubfoot under Ponseti management was "Scored" at each week for HS, MS ad TS (Total Score). The Scores were plotted on a graph to know how the foot was recovering on the roadmap of treatment. The feet were classified into three categories with respect to the severity of the deformity on the basis of initial Pirani score.

Group-I: Pirani score of 1.5-2.5 points.
Group-II: Pirani score of 3-4.5 points.
Group-III: Pirani score of >5 points.

Treatment Regimen

The Ponseti technique[5,6] was used at our institution according to the following regimen.

1. Treatment was started as soon as possible after birth and consisted of gentle manipulation of the foot and the serial application of long leg plaster casts as described by Ponseti. The cavus was corrected first by supinating the forefoot and dorsiflexing the first metatarsal. To correct the varus and adduction, the foot in supination was abducted while counter pressure was applied with the thumb against the head of the talus. Heel varus was corrected by abduction of the foot distal to the talus, which allowed lateral rotation of the navicular, cuboid, and anterior aspect of the calcaneus. The heel must never be forcibly everted while the calcaneus is locked under the talus because this will cause a breach in the midfoot and result in a bean-shaped foot.[7] The equinus was not addressed until all other deformities were corrected, and the foot was able to be abducted 50^0 to 60^0 on the talus. When full abduction of the foot on the talus was achieved, the equinus was corrected by percutaneous. Achilles tenotomy or by casting. percutaneous tenotomy of the Achilles tendon was performed if-
   a. Residual equinus was observed i.e. after the deformity is corrected but 15^0 of dorsiflexion has not been obtained with use of casts.
   b. When HS>1, MS<1 and the head of the talus was covered.

Figure 2

Figure 3. Serial above Knee Pop Casts in Ponseti Technique

After the Treatment the Results were Graded as Good, Fair, Poor-

Good- Foot with Pirani score of 1 or less is considered good.
Fair- If additional surgical procedure like subtalar release or posterior ankle release were done to get correction.
Poor- Ponseti technique failed to obtain complete correction of foot.

Follow up

After the last cast was removed and once all deformities were corrected, the patients were given Steenbeek Foot Abduction Brace. 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

The present study includes treatment and follows up to 34 children with idiopathic clubfoot which were managed by Ponseti method of correction and above knee POP cast application after recording the deformity with Pirani scoring and if required percutaneous tendoachilles tenotomy. The following observations were made.

Age Distribution

Age	Number of Cases	Percentage
0-6 month	23	67%
0.6-1 year	5	14%
1-2 year	6	17%
Table 1. Age Distribution		

Most of the children were below 6 months of age. The youngest in the series was of 8 days, while oldest was of 1 year 10 months. Treatment was begun at less than six months of age in 23 cases (67%).

Sex	Number of Cases	Percentage
Male	24	70%
Female	10	30%
Total	**34**	**100%**
Table 2. Sex Distribution		

Male predominated the series consisting about 70% of the population. The male to female ration in the series was 2.4:1.

Side	Number of Cases	Percentage
Right	15	44%
Left	9	26%
Bilateral	10	30%
Total	34	100%
Table 3. Side Affected		

On the 34 cases, twenty-four had unilateral and ten (30%) had bilateral involvement. Right side was found to be more commonly involved (44%) in unilateral cases when compared to left (26%).

Foot	No. of feet	Percentage
Supple	28	82%
Rigid	6	18%
Total	34	100%
Table 4. Mobility of Foot		

Foot was classified into supple type, if manual reduction was possible; and rigid type, where manual reduction was impossible. By this method, 82% feet were rated as supple and 18% as rigid, at time of initial presentation.

Group	Score	No. of Feet	Percentage
I	1.5-2.5	0	-
II	3.0-4.5	18	52%
III	>5	16	48%
Total		34	100%
Table 5. Pre-Treatment Pirani Scores			

The deformity was classified, according to the Pirani scoring system into 3 groups. Group-I with a Score of 1.5 to 2.5 points ABSENT, Group-II with a Score of 3 to 4.5 points was seen in eighteen feet (52%) and group-III the most

common category with a Score of >5 points was seen in 16 feet (48%).

Age	Cast Required			Total
	4-6	7-9	>10	
0-6 month	15	6	2	23
0.6-1 year	1	1	1	5
1-2 year	---	---	4	6
Total	16	7	7	34

Table 6. Age Versus Number of Casts Required

Patients presenting early after birth required lesser number of casts compared to those who presented late.

Group	Score	No. of Cast		
		4-6	7-9	>10
0-6 month	1.5-2.5	---	---	---
0.6-1 year	3.0-4.5	4	1	3
1-2 year	>5	13	6	4

Table 7. Initial Pirani Score versus No. of Casts Required

Group	Tenotomy Done		Tenotomy not Done		Total No. of Feet	
	Foot	%	Foot	%	Foot	%
I	---	---	---	---	---	---
II	16	88%	2	12%	18	100%
III	16	100%	---	---	16	100%

Table 8. Need for Tenotomy among Different Groups

In group-II with Score of 3 to 4.5 points, 16 feet (88%) underwent percutaneous tenotomy, while in group-III with Score of 5 points; all feet (100%) required the tenotomy.

Complications	No. of Feet	Percentage
Abrasion	2	6%
Loosening of cast	1	3%
Blister	1	3%

Table 9. Complications

Results	No. of Patient	Percentage
Good	31	91%
Fair	3	9%

Table 10. Result of Treatment at Final Follow up

DISCUSSION

Congenital idiopathic clubfoot is a common congenital foot deformity, is treated by widely accepted and acclaimed Ponseti technique to achieve early correction. In the present study, 34 cases of idiopathic clubfoot were treated by Ponseti method to assess the role of Pirani scoring system. Using a prescribed format, the data was collected, assessed, analysed and compared with other series and observations were made as follows.

Side and laterality

In the present study, males were (24 cases, 70%) more commonly involved in accordance to other studies. As regards to laterality, in our study 30% (10 cases) were bilateral and 24 cases (70%) were unilateral in concordance with other series.

Tenotomy

In the present study, 32feet (94%) underwent tenotomy comparable to studies done by Scher et al and Colburn et al.[8] In M Changulani et al[9] study, 85% (n= 100) patients required tendoachilles tenotomy. In Noam Bor et al[10] study, 97% (n=36%) patients required tendoachilles tenotomy.

Initial Pirani Score vs. Number of Casts

In our study, the number of casts required to achieve complete correction increased with increase in the initial Pirani score. Raju Rijal[11] et al showed in their series, less number of casts with less Pirani score. PJ Dyer and N Davis[12] in their series showed at least 4 casts required for full correction of initial Pirani score of 4 similar to our study. Noam Bor et al in their series had mean total Pirani score of 4.7 (2 to 6) and mean number of casts required was 6 similar to our study.[10]

Number of Casts

In our study, the mean number of casts required to correct the deformity was 8 (range 4-15) and was comparable to other studies.

In PJ Dyer et al study, the mean number of casts required to correct the deformity was 5.31.[12] Lehman et al[13] was able to obtain correction with casting average of 5.4 (range 4-9).

In our study Group 2 cases are more than Group 1 and 3.

Results were more satisfactory in cases with low Pirani score. Education of the parents plays an important role in the compliance of the cases.

In the present study, complications observed were, abrasion and blister and loosening of cast. Lehman et al[13] reported 25 complications with rate of 10.2%.

CONCLUSION

Ponseti method of conservative management is very effective in treating idiopathic clubfoot. Patients with low Pirani score respond faster to treatment. Tenotomy is necessary to correct equinus deformity. Maintenance of corrected deformity in a brace is necessary to avoid recurrence. We have observed that duration for correction of different deformities by Ponseti is not uniform. It varied in each patient depending on initial Pirani score which indicated the initial elasticity of the musculo-ligamentous structures. Good casting technique is necessary to avoid complications.

Limitation of our study is a short follow up.

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