



Correlation of Pirani score and Foot bimalleolar angle in the treatment of idiopathic congenital talipes equino varus by Ponseti method in infants

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Aim : Correlation of Pirani score and Foot bimalleolar (FBM) angle in the treatment of idiopathic congenital talipes equino varus (CTEV) by Ponseti method in infants.

Material and Methods : 35 feet with idiopathic CTEV deformity < 1 year were prospectively treated by Ponseti method. Deformity evaluated each successive week of treatment by Pirani score and FBM angle. Feet were divided according to Pirani score in groups : one(0-2.0), two(2.5-4) and three(4.5-6). Correlation between mean Pirani score and mean FBM angle was evaluated every week and at follow up, firstly by using Pearson's and Spearman's correlation and then, after dividing data in groups by using ANOVA.

Results : Correlation between Pirani score and FBM angle was statistically significant (p value < 0.05).

Conclusion : Pirani score decreases and FBM angle increases with correction. Pirani score and FBM angle correlated in severity of deformity and correction achieved, thus FBM angle provides objective evidence of clubfoot deformity/improvement/deterioration.

classify the severity of deformity and to objectively demonstrate the subtle correction/deterioration while on treatment and at follow-up.

Clinical evaluation of clubfoot and severity is assessed by various scores like (1) Pirani score, (2) Dimeglio score, (3) Catterall, (4) Harrold and Walker. All these classifications are subjective and have interobserver and intraobserver variation and do not give objective evidence of the severity of deformity (4).

Pirani score gives a numerical value to severity of clubfoot deformity and ranges from 0-6. It is a subjective criterion to assess the severity of correction of deformity. It is found to be most useful as

INTRODUCTION

Congenital talipes equino varus (CTEV) is one of the commonest congenital foot anomalies being more common in male (Male: Female 3:1) (1). Ponseti method of treatment recently evolved with more than satisfactory results compared to Kites method. Ponseti claimed to drop surgical intervention in 90% of cases (1,5-8). It is important to

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it is reliable, quick and easy to use (4). Correlation of Pirani score and FBM angle has been studied in one study to measure the severity of club foot, its predictive value for correction / recurrence and in the management of CTEV (4).

Foot bimalleolar (FBM) angle is drawn on podogram and is correlated with severity of clubfoot deformity (3). Advantage of FBM angle is it being an objective degree to measure the severity of CTEV. Normal value is 82.5° in infant (3). Correlation of Pirani score and FBM angle has been studied in one study to measure the severity of clubfoot, its predictive value for correction / recurrence and in the management of CTEV (4).

Correlation of Pirani score and FBM angle has not been studied prospectively while treating a clubfoot patient in successive stages of treatment by Ponseti method. This study was done to see whether FBM angle can be used to assess severity of deformity, to see correlation of FBM angle with Pirani score and to see correlation of FBM angle with even broader group of Pirani score.

MATERIALS AND METHODS

35 feet of 24 children with idiopathic CTEV deformity were prospectively treated by Ponseti method from Nov 2012 to April 2014 on outpatient basis in CTEV clinic, at a tertiary care center, after taking clearance from institutional ethical committee and consent of the parents / guardian of the patients.

Patients with idiopathic congenital clubfoot <1 year were enrolled. Clubfoot secondary to arthrogryposis multiplex congenita, cerebral palsy, spina bifida were excluded.

Pirani score and FBM angle were calculated at the initial assessment and at every week while changing subsequent cast during treatment. Pirani scoring is a simple scoring system based on six clinical signs (4). Deformity in this study was evaluated by Pirani score (Table I).

For FBM angle, keeping the foot in weight bearing position, foot tracings were taken on a plain paper. Simultaneously mid points of both malleoli were marked on the same footprint by placing a pencil on both sides. Long axis was drawn taking

Table I. — Pirani score

Deformity		Severe	Mild	Absent
Hind-foot Deformity	Posterior Heel Crease	1	0.5	0
	Empty Heel	1	0.5	0
	Rigidity of Equinus	1	0.5	0
Mid-foot Deformity	Curvature of Lateral Border of Foot	1	0.5	0
	Medial Crease	1	0.5	0
	Lateral head of Talus	1	0.5	0

Table II. — Mean Pirani score and Mean FBM angle each week

Duration	Mean Pirani score	Mean FBM angle
0 week	5.10	65.89
1 st week	4.08	69.97
2 nd week	3.14	73.37
3 rd week	2.16	76.74
4 th week	1.22	79.56
5 th week	0.48	82.00
6 th week	0.14	82.73
7 th week	0.00	82.00

second toe and midpoint of broadest part of heel as 2 reference points. Bimalleolar axis i.e. line joining both the malleoli was drawn and where it intersects with long axis of foot forms an anteromedial angle known as FBM angle (4).

Ponseti method was used for correction of deformity. Corrective process utilizing Ponseti technique was divided into two phases: (1) Treatment phase and (2) Maintenance phase. After treatment phase of cast correction if equinus of 10° or more persisted, once the forefoot abduction achieved 50°-70°, then tenotomy was done. In maintenance phase, patient was provided with Steenbeek foot abduction brace for 6 months. Follow up was done at 3rd and 6th month.

Patients were placed in three groups i.e. group one (Pirani 0-2.0), two (Pirani 2.5-4) and three (Pirani 4.5-6) in a similar way as of Jain et al to make data assessment more organized (4). Correlation between mean Pirani score and mean FBM angle was seen every week and at follow up (3rd month and 6th month), firstly by using Pearson's and Spearman's correlation and then, after dividing data in groups by using ANOVA.

RESULTS

There were 24 children i.e. 19 male and 5 female in the present study. 11 children had bilateral feet affected and remaining unilateral affection. Mean age of presentation was 3.05 (1-6 month).

Pirani score and FBM angle were recorded at the start of treatment of every patient. They were recorded every week. With treatment; Pirani score went on decreasing and became zero and FBM

Angle went on increasing and became 82.00 when all the patients were treated. During follow up (at 3 month and at 6 month) Pirani score was 0 and FBM angle was 82.00 (Table II).

Every week and at follow up correlation between Pirani score and FBM angle was seen, firstly by using Pearson and Spearman's correlation and then, after dividing data in groups by using ANOVA test.

Pearson's correlation and Spearman's correlation coefficient was negative throughout the study (every week up to 7th week) showing negative relation between FBM angle and Pirani score. P value was significant throughout the study therefore showing significant correlation between FBM angle and Pirani score. Pearson's correlation and Spearman's correlation could not be calculated in 7th week, 3rd month and at 6th month because at least one of the variables was constant (Table III).

The whole data was divided into three groups of Pirani score (as mentioned earlier). Number of patients in each group was Group 1 = 100, Group 2= 66 and Group 3 = 50. Again correlation was found between mean FBM angle and mean Pirani score of this compiled data using ANOVA and it was statistically significant (p value<.05) (Table IV) .

Complications

Complications which occurred in this study were pressure sore in 6 patients, skin blisters in 1 patient, Eczema in 3 patients, Bruise over thigh in 4 patient, Slippage of cast in 3 patients, Overcrowding of toes in 1 patient, Cast breakage in 5 patients. There were no major complications like rocker bottom foot or flat foot.

Table III. — Spearman's correlation and Pearson correlation

Duration	N	Spearman's correlation	P value	N	Pearson correlation	P value
0 week	35	-0.464	0.005	35	-0.371	0.028
1 st week	35	-0.565	<0.001	35	-0.525	0.01
2 nd week	35	-0.635	<0.001	35	-0.683	<0.001
3 rd week	35	-0.706	<0.001	35	-0.733	<0.001
4 th week	35	-0.843	<0.001	35	-0.832	<0.001
5 th week	29	-0.779	<0.001	29	-0.887	<0.001
6 th week	11	-0.552	0.079	11	-0.591	0.056

Table IV. — Correlation by ANOVA Test

	Mean Pirani Score	Mean FBM Angle	P value
Group 1	0.90	80.61	<0.05
Group 2	3.28	73.02	<0.05
Group 3	5.12	66.16	<0.05

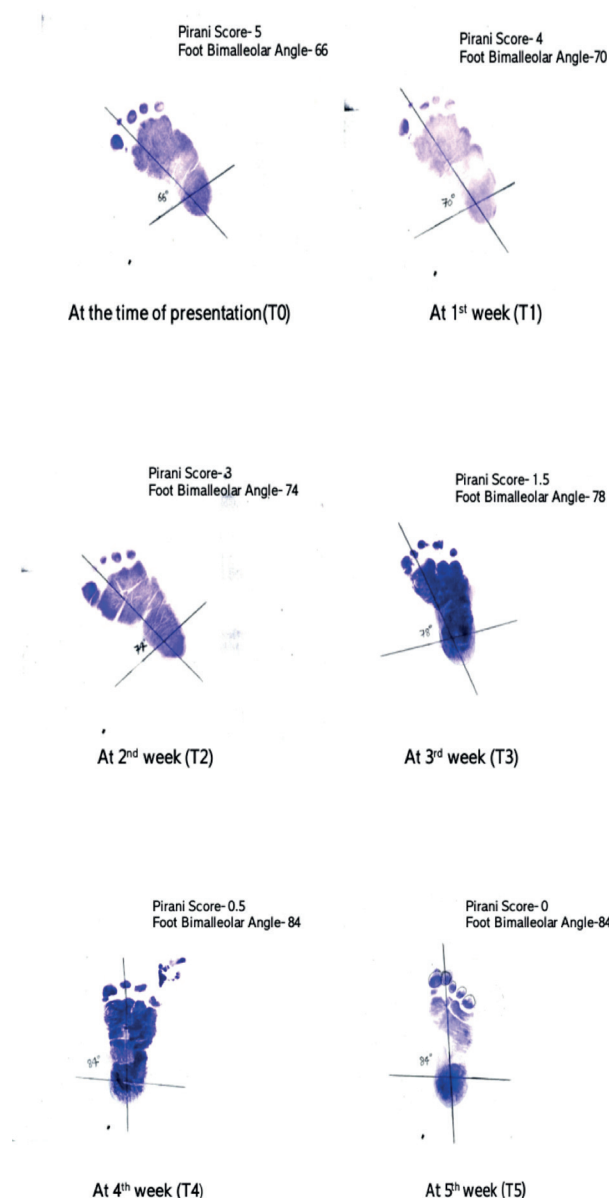


FIG. 1-3. — Podograms showing FBM angle and Pirani score of case no.25 at successive weeks of treatment (till completion of treatment)

DISCUSSION

FBM angle provides an objective evidence of clubfoot deformity, improvement or deterioration (4). FBM angle quantifies the CTEV deformity depending on the objective assessment of calcaneal rotation. FBM angle depends on the shape of heel and position of forefoot (3). FBM angle is a combined indirect indicator of forefoot adduction and hind foot varus (which are main variants of the club foot deformity), although it does not give the access of the equinus (minor variant) (3).

Wainwright assessed the reliability of classification described by Ponseti and Smoley, Dimeglio et al., Catterall, Harrold and Walker. He concluded that the system of Dimeglio et al. has the greatest reliability but he concluded that current classification systems for the analysis of CTEV are not entirely satisfactory (9). So we need to have some simple, objective criteria for the assessment of severity of deformity in CTEV.

Pirani score is reliable, quick, and easy to use. However Pirani system is not sensitive and accesses tend to give a diagnosis of moderate abnormality as there are only three levels of scoring 0, 0.5, and 1 (4). Pirani score is most commonly used scoring system hence was used to correlate FBM angle.

In study by Jain et al Foot tracings were taken of 182 feet (91 normal Indian infants) and FBM angle in them was calculated as 82.5 degrees. Mean FBM angle was 82.3 degrees of eighty-four CTEV foot (51 patients) after treatment by non surgical method. However it was a retrospective study done from the hospital record data and outcome was not recorded sequentially. Few patients were enrolled so each sub groups had very less data. Hence, that data failed to establish correlation between Pirani score and FBM angle (3).

In the study by Jain P et al 244 club feet of 137 children were taken. However data collection was not of well identified cases and cases taken were not sequentially followed. From this heterogeneous data correlation was found between Pirani score and FBM angle which was statistically significant. Moreover it did not indicate any change in FBM angle due to correction of deformity (4).

CONCLUSION

In the present, to the best of our knowledge, this is the only prospective study showing correlation of FBM angle and Pirani score in each step of treatment of idiopathic CTEV. FBM angle increases with correction of foot so it can be used for objective assessment of the clubfoot deformity/improvement/deterioration.

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