



THE RELIABILITY OF PIRANI SCORING SYSTEM IN THE MANAGEMENT OF IDIOPATHIC CLUBFOOT USING PONSETI METHOD

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ABSTRACT

Introduction: Ponseti method in the treatment of congenital clubfoot has led to a renewed interest in this method among orthopaedicians. Pirani scoring system has been authenticated to analyse the severity and to monitor treatment of clubfoot

Aims & Objectives: The Aim and objectives of the study were to assess the results of Pirani scoring system in terms of the number of foot corrected and the need for tenotomy. This study primarily focuses on our experience in applying the ponseti method in the management of congenital clubfoot.

Methodology: This study was conducted between October 2014 to September 2016. A total of 25 cases & 42 feet were treated by this method with the mean follow-up time of 18 months (6 to 36). The standard method as described by Ponseti using Plater of paris were applied from 3rd week after birth and changed at weekly interval until correction was attained. Percutaneous tenotomy of tendo-achillis were performed only to persistent equinus deformities. Pirani score was used for assessment of the deformity.

Result: Mean Pirani score improved from the first cast to the time before tenotomy. Tenotomy was required in 32 of the total 42 feet. 6 out of 42 feet were successfully treated by casting only. Of the total 38 feet corrected by serial casting and tenotomy there was no recurrence. The remaining 4 required extensive soft-tissue release.

Conclusion: Pirani scoring system is highly validated in terms of assessment of severity and for monitoring prognosis of idiopathic clubfoot corrected by Ponseti method.

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INTRODUCTION

Clubfoot has from long been an unsolved clinical challenge for the orthopedic surgeons. The problem is more serious in the developing countries on account of late presentation; higher rate of dropouts (of treatment) and superstitious beliefs attached to this congenital problem.

Nonsurgical management generally led to inadequate correction whereas those children with idiopathic clubfoot who underwent surgery often developed extensive scarring of the soft tissues and residual pain. But these statements have been frequently sidelined by those people

who use Ponseti method of serial manipulation and casting.

Ponseti claims to avoid open surgery in 89% of cases by using his technique of manipulation, casting, and limited surgery (1). Cooper and Dietz reviewed Ponseti's cases, with an average of 30 years of follow-up, and found that 78% of the patients had achieved excellent or good functional and clinical outcomes compared with 85% in a control group without congenital foot deformity (2). Careful evaluation of Ponseti technique and the results of manipulation were done with the aim of;

- Studying the effectiveness of Ponseti's technique of plaster cast application in the management of idiopathic clubfoot.

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- Assessing the deformity using Pirani severity score.

Club foot scoring systems

There is no agreed method of grading the severity of deformity or monitoring the natural history, but there is a reported need for such a classification, (3-5) which should be reliable, reproducible, feasible in a clinical setting, and predict appropriate treatment. (3)

Pirani *et al* (6) devised a simple scoring system based on six clinical signs of contracture. Each is scored according to the following principle:

- 0, no abnormality;
- 0.5, moderate abnormality;
- 1, severe abnormality.

These six signs are separated into three, related to the hindfoot (severity of the posterior crease, emptiness of the heel and rigidity of the equinus), and three related to the midfoot (curvature of the lateral border of the foot, severity of the medial crease and position of the lateral part of the head of the talus).

Thus, each foot can receive a hindfoot score between 0 and 3, a midfoot score between 0 and 3 and a total score between 0 and 6.

When assessed for inter-observer reliability, the kappa score showed this to be almost perfect and much better than any of previous scoring system. (3,6) This is very simple and most reliable system. According to this the foot can be assessed by the observer very fast and can be done as out patient procedure. Although we know the scoring system describes the deformity we do not know whether it can yield any further information such as treatment required, prognosis and outcome.

Scher *et al* (7) compared Pirani *et al* (6) and Dimeglio *et al* (8) scores with the need for a tenotomy. In relation to Pirani, 85% of feet with a score above 5 required tenotomy, significantly more than those that did not ($p = 0.0003$).

Parents whose children are starting Ponseti treatment are likely to enquire whether a tenotomy will be required. Scher's study suggests that the Pirani system would answer this question. Another concern is the number of casts their baby will require. We wondered if the Pirani score would allow the surgeon to give more specific advice.

This study evaluated the Pirani club foot scoring system during the early stages of Ponseti treatment.

MATERIALS AND METHOD

We treated 25 children with 42 congenital talipes equinovarus feet using Ponseti technique. The study was cleared by institutional research cell and the ethical committee. The study period was from October 2014 to September 2016. All children who were brought to our outpatient department of orthopaedics with complaints of deformity of foot were screened. Those having congenital talipes equino-varus deformity and age less than two years were included in the study. All secondary, relapsed,

recurrent, syndromic congenital talipes equino-varus and those above two years were excluded from our study. The deformity grading for both pre and post correction was done using Pirani scoring and deformities were graded upto maximum point of six. Clinically the foot was evaluated for medio-lateral border ratio, degree of hind foot equinus, fore foot adduction, heel varus and foot cavus. All the case were done manual cast application using plaster of paris by a single person using the Ponseti method as an outpatient procedure. When the mid-foot score was less <1 and hind-foot score was >1 after manipulation and casting, percutaneous tendoachilles tenotomy was done under local anaesthesia either as an out patient procedure or in operation theatre. Once forefoot and hind foot is aligned, then abduction is started progressively and percutaneous tenotomy of Achilles tendon was done if needed and final corrective cast was applied for three weeks with foot held in maximum abduction and equinus after tenotomy.

Those cases that showed little or no correction even after ten cast applications were treated as failure and were done surgical correction. A foot orthosis (Dennis brown splint) was given after removal of the final cast. The orthosis was removed for not more than one hour every day and continued till the child starts walking. Once the child had started walking CTEV shoes were used during daytime and foot orthosis was used during night. The manipulation and casting was done by one consultant in all cases. The number of casts required to obtain correction was also recorded. Demographic data including age, sex and laterality of the deformity along with mode of child birth was noted. Children were followed up every week during the manipulation and casting stage and every month for 3 months once the orthosis was applied. Parents were advised to strictly adhere to the bracing protocol. Those who did not show correction were treated surgically.

All children were also assessed according to Catterall-Pirani scoring system (CP Score) and comparison between initial CP score (cpi) and final CP score after casting and tenotomy (if required) at 3 months (cpf1), 6 months follow up was recorded. All the pre-treatment and post-treatment data of clinical, were statistically analysed.

RESULTS

In our study total correction of the deformity was obtained in 38 feet (8 unilateral and 15 bilateral CTEV). In our study, the end point for castings was taken as ten casts. Percutaneous tenotomy was done when equinus was present after required casting and was done as opd procedure or in operation theatre.

Out of 42 feet, 6 feet achieved full correction at the end of initial casting without percutaneous tenotomy and 32 feet were fully corrected with percutaneous tenotomy. Four feet were not corrected with Ponseti method and were considered as failure cases. They were referred for posteromedial soft tissue release. No dropouts were faced in our study

The mean age at initiation of treatment for 25 patients (42 feet) was 34.72 days (range 15 days to 90 days).

The mean initial Pirani severity score for 42 feet was 4.50 (out of maximum possible score of six). After full correction by ponseti technique (with or without percutaneous tenotomy) the final mean score was found to be 0.56 and the mean change in score was found to be 3.94. This was analysed by the paired t test and the p value was <0.0005 which is significant. The mean value of Pirani score at 6 months follow up was 0.11 which shows a change of 4.39 from the initial score. This change also has a p value of <0.0005 which is significant.

Table1 Details of Percutaneous tenotomy done

Tenotomy	No. of patients	Percent age	Midfoot score	Hindfoot score
Done	19	76.0	2.32	2.91
Not done	6	24.0	1.98	1.73
Total	25	100.0		

Table 2 Pirani score

Pirani score	N	Mean	Std. Deviation	Std. Error Mean	t value	Sig.
Before	25	4.5000	0.76376	0.15275	21.766	0.000
After	25	0.5600	0.48563	0.09713		

Table 3 No. of Castings

No. of Castings	Mean Pirani Score Before treatment	No. of patients	Percentage
6	3.76	3	12.0
7	4.12	3	12.0
8	4.34	8	32.0
9	4.98	5	20.0
10	5.34	4	16.0
12	5.5	1	4.0
13	5.5	1	4.0
Total		25	100.0

DISCUSSION

This study shows that the Pirani scoring system can be used to clarify the need for tenotomy and allows an estimate of the number of weekly plaster casts required. The most striking finding is a strong link between the initial Pirani score and the duration of treatment shown graphically and by Spearman's correlation coefficient. 25 children with congenital clubfoot participated in the study. Total number of clubfeet was 42. All the patients were of age 15 to 90 days (range: 15 days to 90 days) at initial casting. Mean age of the group was 34.72 days. Morcuende *et al.* had retrospectively analysed the records of 157 patients (256 clubfeet). In this study also all the patients were of the age group 0 to 24 months. There were 14 male children and 11 female children in the present study and the male: female ratio is 1.27:1. Morcuende *et al.* reported a male female ratio of 2.13: 1. The male preponderance found in this study is in agreement with other studies.

The feet were evaluated using Pirani severity scoring system which was easy to use and simple and fairly reproducible and scoring could be done in minutes. In our study the scoring was done by a faculty who was not involved in the study and casting was done by the author throughout the period of study. The points in the Pirani scores are allotted on the basis of inspection findings of the sole of the foot, lateral border, posterior and medial creases, palpability of the talus and emptiness of the heel as well as correctability of equinus.

In about nineteen patients (76%), percutaneous tenotomy of tendoachiles was done in order to achieve complete correction. Ponseti himself has observed that percutaneous tenotomy was needed in most of the patients.

Thus it is very evident that a more deformed foot requires greater intervention (Table.3).

This correlation persists when the tenotomy and nontenotomy groups are compared. This is an easy rule to remember and a useful guide when advising parents. The study found a significantly higher initial Pirani score in feet requiring a tenotomy, which also required significantly more casts, suggesting that the better feet correct without the need for surgical intervention.

It was also clearly shown that it is the hindfoot rather than the midfoot component of the Pirani score that predicts the need for tenotomy. This is to be expected, as it is the hindfoot equinus that the tenotomy is correcting.

Of the feet with a hindfoot score of 2.5 or 3 at initial scoring, 76% (19) required a tenotomy, compared to 24% (6) of those scoring less than 2.5. The scores, although significant, are too variable for confident predictions to be made. One must be careful not to give parents whose children have lower scores the impression that operation will be unnecessary. We have found the Pirani scoring system to be practicable, reproducible and helpful in the management of idiopathic club feet by the Ponseti method.

CONCLUSION

Pirani scoring system is very valuable in evaluating both treatment and outcome prognosis in the management of congenital idiopathic club foot.

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