

Achilles Tenotomy in Patients with Congenital Talipes Equinovarus (CTEV) Treated with Ponseti Technique

Congenital Talipes Equinovarus (CTEV) Treated with Ponseti Technique

Muhammad Kamran Shafi, Ghulam Qadir Khan, Muhammad Ishfaq, Manzoor Hussain and Abdul Hadi

ABSTRACT

Objective: To determine the frequency and outcome of percutaneous Achilles tenotomy in the treatment of congenital clubfoot using the Ponseti method.

Study Design: Prospective study

Place and Duration of Study: This study was conducted at the Orthopedic Department of Nishtar hospital, Multan from October 2022 to September 2023.

Methods: All patients were assessed at the time of presentation and scoring was done by using Pirani scoring system. Ponseti method was used initially to treat clubfoot and cases of persistent equinus deformity were treated with Percutaneous Achilles tenotomy. SPSS version 23 was used for data analysis.

Results: The total Pirani score, mid-foot contracture score and hind-foot contracture score of the patients was 4.21 ± 1.25 , 2.52 ± 0.98 and 2.35 ± 1.08 , respectively. Percutaneous tenotomy was noted in 61.2% patients. No association was found for percutaneous tenotomy with sex, age, Pirani score and laterality of deformity, ($p > 0.050$).

Conclusion: Achilles tenotomy is a safe and effective component of ponseti method of clubfoot treatment. Frequency of percutaneous Achilles tenotomy can be predicted by evaluating the Pirani scores at presentation. If the Pirani scores are low and the condition is detected early, the rate of percutaneous Achilles tenotomy is generally reduced.

Key Words: Achilles tenotomy, Clubfoot, Congenital, Pirani scoring system, Ponseti method.

Citation of article: Shafi MK, Khan GQ, Ishfaq M, Hussain M, Hadi A. Achilles Tenotomy in Patients with Congenital Talipes Equinovarus (CTEV) Treated with Ponseti Technique. Med Forum 2023;34(12):16-19. doi:10.60110/medforum.341204.

INTRODUCTION

Clubfoot or Congenital Talipes Equinovarus (CTEV) is a condition that affects the development of the foot during fetal growth¹. It is characterized by an abnormal positioning of the foot, with the heel turned inward and the forefoot pointing downward. CTEV is a combination of environmental and genetic factors². The condition occurs in about 1 in 1,000 live births and is more common in boys than girls. Treatment for CTEV typically involves a series of casting and bracing to gradually reposition the foot into a normal position³. In some cases, surgery may be necessary to correct the condition.

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Received: October, 2023

Accepted: November, 2023

Printed: December, 2023

With proper treatment, most children with CTEV are able to walk normally and participate in physical activities without any significant limitations⁴.

Achilles Tenotomy is a surgical procedure used to treat Achilles tendonitis. It is primarily used to treat chronic cases of tendonitis that have not responded to conservative treatment such as rest, anti-inflammatory medications, and physical therapy⁵. The Achilles tendon is a thick and strong tendon that connects the calf muscles to the heel bone⁶. When the Achilles tendon is too tight or shortened, it can cause pain, stiffness, and difficulty walking. Achilles tenotomy is often used to treat conditions such as clubfoot a conditions that result in a tight Achilles tendon⁷.

The Ponseti Technique involves a series of gentle manipulations and casting to gradually move the foot into a corrected position⁸. The technique was developed by Dr. Ignacio Ponseti in the 1950s and has become the standard of care for clubfoot treatment⁹. The Ponseti Technique has a high success rate, with most babies achieving a fully corrected foot with no need for surgery. It is a safe and effective approach to treating clubfoot, and is now used around the world as the standard of care¹⁰.

METHODS

This study was conducted at Orthopedic Department of Nishtar hospital, Multan from October 2022 to September 2023 in one year duration. Study was approved by the ethical committee. Confidence interval 95, absolute precision 3%, proportion of previous study 96.36%, Sample size was 250. Non probability, consecutive sampling was used. Patients of age 0-6 months, patients diagnosed on clinical finding and both genders were included. Patients with complex CTEV foot associated with syndromes excluded from study. Patients presented at outpatient’s department of orthopedic unit with clubfoot and age less than six months were enrolled. Signed written consent was taken from parents of children. Study ID number was allotted to ensure confidentiality of data. The researcher of this study assisted to manipulate during application of Ponseti casting while cast was applied by the Assistant professor or above of orthopedic department. Patients were asked for follow up on every week and assessment of patient’s mobility was recorded by another observer who is unaware of study participants even he is not allowed to see the procedure performed. At 6th week final outcomes were measured and declared. Data entry and analysis was done on SPSS (version 27). All variables (numerical or categorical) were analyzed for mean ± SD and frequency percentages. P-value ≤0.05 was considered as significant.

RESULTS

Overall, 250 patients were included in this study, both 167 (66.8%) males and 83 (33.2%) females. The

average age of the patients was 8.54±5.41 months. Majority of the patients 108 (43.2%) were between age 0-6 months. There were 61 (24.4%) patients had right laterality, 72 (28.8%) patients had left laterality whereas, 117 (46.8%) patients had bilateral. (Figure. 1). The total Pirani score, mid-foot contracture score and hind-foot contracture score of the patients was 4.21±1.25, 2.52±0.98 and 2.35±1.08, respectively. (Table. 1). Percutaneous tenotomy was noted in 153 (61.2%) patients. (Figure. 2). No association was found for percutaneous tenotomy with sex, age, Pirani score and laterality of deformity, (p>0.050). (Table. 2).

Table No. 1: Demographic and baseline characteristics of the patients

Variable	Observed value
Sex	
Male	167 (66.8)
Female	83 (33.2)
Age (month) Mean ± S.D	8.54±5.41
0-6	108 (43.2)
7-12	81 (32.4)
13-18	47 (18.8)
19-24	14 (5.6)
Laterality	
Right	61 (24.4)
Left	72 (28.8)
Bilateral	117 (46.8)
Total Pirani score	4.21±1.25
Mid-foot contracture score	2.52±0.98
Hind-foot contracture score	2.35±1.08

Table No. Association of percutaneous tenotomy with sex, age, Pirani score and laterality of deformity

Variable	Tenotomy 153 (61.2%)	No Tenotomy 97 (38.8%)	p-value
Sex			
Male	102 (66.7)	65 (67.0)	0.955
Female	51 (33.3)	32 (33.0)	
Age (month)			
0-6	67 (43.8)	41 (42.3)	0.549
7-12	45 (29.4)	36 (37.1)	
13-18	32 (20.9)	15 (15.5)	
19-24	9 (5.9)	5 (5.2)	
Initial Total Pirani Score			
≤2.0	7 (5.3)	5 (5.6)	0.981
2.5-4.0	59 (45.0)	41 (46.1)	
4.5-6.0	65 (49.6)	43 (48.3)	
Laterality			
Right	38 (24.8)	23 (23.7)	0.978
Left	44 (28.8)	28 (28.9)	
Bilateral	71 (46.4)	46 (47.4)	

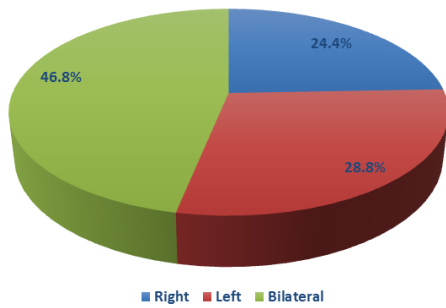
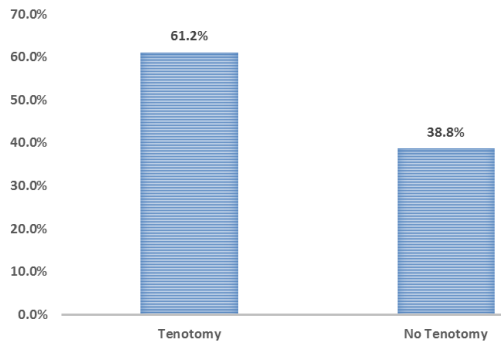


Figure No.1: Laterality Distribution



Figure

No. 2: Percutaneous Tenotomy distribution of the patients

DISCUSSION

Clubfoot is a congenital deformity that affects one in 1000 live births. The Ponseti method is a non-invasive strategy that has gained popularity in recent years as an alternative to extensive soft-tissue release surgery¹¹. This method involves a series of manipulations and casts, an Achilles tenotomy, and foot abduction bracing. Both short and long term data have demonstrated the success of this method, making it a viable option for the treatment of clubfoot¹².

In this study there were 66.8% males and 33.2% females and average age of the patients was 8.54±5.41 months. Majority of the patients 108 (43.2%) were between age 0-6 months. The study conducted by Hussain et al¹³ focused on identifying the prevalence of bilateral and unilateral deformities in patients. The results indicated that out of the 40 patients studied, 12 (30%) had bilateral deformities. Further analysis showed that 5 (12.5%) of these patients were male while 7 (17.5%) were female. On the other hand, the remaining 28 (70%) patients had unilateral deformities, with 16 (40%) being male and 12 (30%) being female. Noam Bor and Julie's¹⁴ study on clubfoot recorded 74 patients with a total of 117 clubfeet, 59 of which were left feet and 58 were right feet. There were 26 girls and 48 boys, with 43 patients having bilateral clubfoot and 31 having unilateral clubfoot (15 right feet, 16 left feet). The mean age for treatment presentation was 67.1 days with a median of 7.5 days and a range of 1-630 days. This study provides valuable information on the prevalence and characteristics of clubfoot, which can aid in the development of effective treatment plans.

The total Pirani score, mid-foot contracture score and hind-foot contracture score of the patients was 4.21±1.25, 2.52±0.98 and 2.35±1.08, respectively. The study conducted by Hussain AS et al¹⁵ focused on the prevalence of clubfoot in a local population. The study included a total of 70 patients, with 38 males and 32 females, aged between 6 months to 3 years. Out of these patients, 23 had bilateral deformity, with 9 being male and 14 being female, while the remaining 47 had unilateral deformity, with 29 being male and 18 being female. The study provides insight into the prevalence of clubfoot in the local population, indicating that it affects both males and females, with a higher prevalence in males. In a study conducted by Elshenawy and Hassanen¹⁶, 95.5% correction of clubfoot was achieved using the Ponseti method. This highlights the effectiveness of the method in treating clubfoot and reducing the need for extensive corrective surgery. Moreover, the Ponseti method is a safe and efficient treatment that has revolutionized the management of clubfoot.

It has been found to be highly effective, even in children as young as one year old, and can be used as a first-line treatment before resorting to surgery. In a study by Kampa R¹⁷ et al, the Ponseti method successfully corrected the deformity in 95% of feet studied, with a follow-up period of 31 months. This highlights the effectiveness of this method in treating clubfoot. According to a study by Abbas and Qureshi¹⁸, the Ponseti technique achieved correction in 95% of clubfeet cases, making posteromedial soft tissue release unnecessary for most cases of idiopathic clubfoot. The Pirani scoring system can be used to monitor the treatment progress, with a higher score indicating a need for more casts to correct the deformity.

The Ponseti method is a non-invasive treatment for clubfoot, a condition where the foot is twisted out of shape or position. Gupta et al¹⁹ treated 154 feet in 96 children using this method, which involves gentle manipulation and casting of the foot. After six months of treatment, the Pirani score, which measures the severity of clubfoot, was reduced to zero for all patients.

In this study percutaneous tenotomy was noted in 61.2% patients. No association was found for percutaneous tenotomy with sex, age, Pirani score and laterality of deformity, (p>0.050). Maris G's²⁰ study found that 83% of the 108 feet treated required tenotomy, while in a different study by Nogueira and Amaral²¹, the success rate of the Ponseti method was reported to be 93%, which included treatment of recurrence by recasting and/or Achilles tenotomy. It is important to note that Achilles tenotomy is only recommended when necessary to achieve full correction, and can be predicted using factors such as the initial Pirani scores.

CONCLUSION

Achilles tenotomy is a safe and effective component of ponseti method of clubfoot treatment. Frequency of

percutaneous Achilles tenotomy can be predicted by evaluating the Pirani scores at presentation. If the Pirani scores are low and the condition is detected early, the rate of percutaneous Achilles tenotomy is generally reduced.

Author's Contribution:

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 Data Analysis: Manzoor Hussain, Abdul Hadi
 Revisiting Critically: Muhammad Kamran Shafi, Ghulam Qadir Khan
 Final Approval of version: Muhammad Kamran Shafi

Conflict of Interest: The study has no conflict of interest to declare by any author.

Source of Funding: None

Ethical Approval: No.127/10 dated 21.10.2022

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