Original Article

Predicting The Outcomes Of Achilles Tenotomy For Children Treated With The Ponseti Method For Congenital Talipes Equinovarus

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Abstract

Background: One of the most common birth defects is Congenital Talipes Equinovarus (CTEV) which includes the musculoskeletal system. The occurrence of CTEV is about 2/1000 live births. The Ponseti method was founded in 1972 and has now become the gold standard for treating idiopathic clubfoot nowadays. It is a method that consists of weekly manipulation and serial casting. The process of making a small incision in the Achilles tendon is known as percutaneous Achilles tenotomy which is an essential part of the Ponseti method.

Objective: This research aims to study children with congenital talipes equinovarus (CTEV) and determine the outcomes of Achilles tenotomy after curing them with the Ponseti method to

Study design: A cross-sectional study

Place and Duration: This study was conducted at Ghulam Mohammad Mahar Medical College Sukkur **from January 2022 to January 2023.**

Methodology: All of the participants of this study were children with ages ranging from newborn to 2 years. Pirani scoring was used to measure the severity of the clubfoot. The scores were from 0 to 6 where 6 score determines the severe deformity. The Ponseti serial casting was done every week. At the end of the serial casting, brace treatment without tenotomy was started for those children who do not have residual equinus deformity. Those children who had a Pirani score of 1 or 0.5, and had corrected cavus, and varus along with the head of the talus at the end of casting were given percutaneous Achilles tenotomy under local anesthesia. For these children, the final cast was applied for 2 weeks after the Achilles tenotomy.

Results: Overall, 60 children with CTEV were enrolled in this research. The mean age of the children at the time of Achilles' tenotomy was 10.3 weeks. A total of 76.67% of the children were having unilateral clubfoot deformity and only a small percentage of children had bilateral clubfoot deformity. Overall 66.67% of the children had Achilles tenotomy as equinus deformity should be corrected before the last cast application.

Conclusion: Our research had a very high frequency of Achilles tenotomy after using the Ponseti method because the majority of the participants had persistent equinus deformity

Keywords: percutaneous Achilles tenotomy, children, equinus deformity, Congenital Talipes Equinovarus

INTRODUCTION

One of the most common birth defects is Congenital Talipes Equinovarus (CTEV) which includes the musculoskeletal system [1]. CTEV is also called congenital clubfoot. The occurrence of CTEV is about 2/1000 live births [2]. This occurs more in male children than in female children and the involvement is bilateral in almost half of the cases. The ratio of male and female children is 2.5:1 [3]. CTEV has been treated in several ways since 400 BC. Earlier in 400 BC, the Hippocrates method was used to treat clubfoot [4]. Later in 1836, the Guerin method was used and in 1964, the Kite method was used. The Ponseti method was founded in 1972 and has now become the gold standard for treating idiopathic clubfoot [5]. It is a method that consists of weekly manipulation and serial casting [6]. The process of making a small incision in the Achilles tendon is known as percutaneous Achilles tenotomy which is an essential part of the Ponseti method [7]. It is typically necessary to address a persistent downward bending of the foot, known as equinus deformity that remains after correcting deformities in the front and middle sections of the foot [8]. The range of frequency of percutaneous Achilles tenotomy is from 60% - 80% [9]. The success rate of the Ponseti method is about 95% [10]. As an outpatient procedure, tenotomy can be conducted under local anesthesia [11].

This research aims to study children with congenital talipes equinovarus (CTEV) and cure them with the Ponseti method to determine the outcomes of Achilles tenotomy. This research will determine the exact outcomes and frequency of Achilles tenotomy, we can use these results to convince surgeons to perform Achilles tenotomy because several surgeons are reluctant to use this method.

METHODOLOGY

All of the participants of this study were children with ages ranging from newborn to 2 years. These participants are all those children that were presented to the OPD of the hospital for the duration of the research.

Exclusion criteria: Those children who were diagnosed with Arthrogryposis Multiplex Congenita, myelomeningocele, cerebral palsy, and neuropathic club foot were not enrolled in this research. Moreover, those children who had previously taken treatment for clubfoot in other hospitals were also not enrolled in this research.

The Ethical Committee of the hospital approved this research. Before the initiation of Ponseti serial casting, every child was examined overall from head to toe. Pirani scoring was used to measure the severity of the clubfoot [12]. The scores were from 0 to 6 where 6 score determines the severe deformity. The Ponseti serial casting was done every week. At the end of the serial casting, brace treatment without tenotomy was started for those children who do not have residual equinus deformity. Those children who had a Pirani score of 1 or 0.5, and had corrected cavus, and varus with the head of the talus at the end of casting were given percutaneous Achilles tenotomy under local anesthesia. For these children, the final cast was applied for 2 weeks after the Achilles tenotomy.

SPSS version 21 was used to analyze the data. The mean and standard deviation were recorded for all the quantitative variables (Pirani scores, age, number of casts). All the qualitative variables were expressed in percentages and frequency (unilateral deformity, bilateral deformity, gender, and tenotomy).

RESULTS

Overall, 60 children with CTEV were enrolled in this research. The mean age of the children at the time of Achilles' tenotomy was 10.3 weeks. The mean initial Pirani score was 3.74 and the mean final Pirani score was 1.74. Table number 1 shows the demographics of the participants.

Table Number 1: Demographics of the participants

Variables	**N**	**%**
Age (years)		
• **0-1**	45	75

• **1-2**	15	25
Gender		
• **Male**	36	60
• **Female**	24	40

It was recorded that most of the children were having unilateral clubfoot deformity and only a small percentage of children were having bilateral clubfoot deformity. A correction was achieved in 5.84 castings.

Table No. 2: Side of the deformity

Deformity	**N**	**%**
Unilateral	46	76.67
Bilateral	14	23.33

Most of the children had Achilles tenotomy performed on them so equinus deformity should be corrected before the last cast application. There was no complication reported.

Table No. 3: children having Achilles tenotomy

Tenotomy	**N**	**%**
Achilles	40	66.67
Unilateral	13	21.73
Bilateral	7	11.60

DISCUSSION

The frequency of Achilles tenotomy in our research was 66.67%. If we compare our results with the results of some local and international research studies, we can see that other authors also have similar frequency rates. According to the research of Ponseti IV, it was recorded that the frequency of Achilles tenotomy was 70% and it was 66.4% in the research of Anisi C [13, 14]. These authors concluded that the Pirani score is directly proportional to the frequency of Achilles tenotomy in children with congenital clubfoot. The more the Pirani score, the higher the frequency of Achilles tenotomy. According to Kulambi V, the frequency of Achilles tenotomy was 67.3% [15]. He stated that children having a Pirani score greater than 5 required tenotomy. However, this need was not linked with a bad outcome. According to the research of Adewole OA, the frequency of Achilles tenotomy was 26.6% and he concluded that those children who require tenotomy needed more casts [16]. There was another study conducted by Jain who divided residents into 2 groups. One was an additionally trained group and the other was a classically trained group that did not get much training [17]. Both of the groups were getting a session for using the Ponseti method. The frequency of tenotomy by the additionally trained group was 73.3% while it was 51.5% by the other group. It means that the increased frequency by the additionally trained group was because of the increase in confidence of the trained group after attending the training sessions. According to Sharma, parents of those children who require tenotomy should be aware that the treatment would take a long time and it will include minor surgical procedures [18]. Another author

named Aydin BK recorded a frequency of 85.1% and Islam MS recorded a frequency of 86.4% which are very high rates [19, 20].

CONCLUSION

Our research had a very high frequency of Achilles tenotomy after using the Ponseti method because the majority of the participants had persistent equinus deformity. However, this method should be used under certain conditions so that complications can be avoided. Moreover, parents should be well aware that the treatment will not have any bad outcomes.

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Conflict

No conflict of interest

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