

# Outcome of Early Management of Club Foot by Ponseti Technique

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## ABSTRACT

**Objective:** The Objective of this study is to assess the anatomical correction, cosmetic and functional outcome of the Ponseti method in idiopathic congenital Talipes Equino Varus (CTEV).

**Study Design:** Experimental and case series study

**Place and Duration of Study:** The study was carried out in the Department of Orthopaedic Surgery and Traumatology (DOST) Liaquat University of Medical & Health Sciences Jamshoro for a period of two years from 21-01-2009 to 20-01-2011.

**Materials and Methods:** This study contains 50 cases of congenital talipes equino varus "CTEV". In this study all the cases were selected with age of one year from the birth with congenital "talipes Equino Varus". All the cases with Acquired "Talipes Equino Varus", atypical foot, "talipes Equino Varus" with Arthrogyposis Multiplex Congenital, "talipes Equino Varus" previously treated by method other than ponseti technique were excluded from the study.

**Results:** Total 50 cases of congenital Talipes Equino Varus (CTEV) having 77 feet were analyzed in this study with (male female ratio 1:7). Out of 50 cases, 27 (54.0%, n = 50) had bilateral (54 feet) deformities and 23 (46.0%, n = 50) cases were unilateral deformities. Severity was assessed according to Pirani Scoring system. 48 (62.0%) had severe foot deformity while 29 (37.60%, n = 77) patients had moderate foot deformity. Out of 77 feet, rocker bottom foot deformity developed in 03 (3.8%) feet, increased stiffness of ligaments and joints occurred in 1 (1.2%, n = 77) foot while vascular complications like skin ulceration and necrosis was observed in 1 (1.2%, n = 77) feet. At the end of 2 to 3 years follow-up period, in 72 (94.0%, n = 77) patients congenital clubfoot deformities were corrected successfully by using Ponseti method while 05 (6.0%, n = 77) patients were not fully corrected due to other complications.

**Conclusion:** The Ponseti method is a fast, safe and effective treatment for congenital idiopathic clubfoot and radically decreases the need for extensive corrective surgery.

**Key Words:** Ponseti method, idiopathic congenital Club feet, 12 months age.

## INTRODUCTION

Idiopathic congenital talipes equinovarus (CTEV) is a relatively common complex three dimensional deformity of the foot affecting approximately 1–2/1,000 newborns<sup>1</sup> and about 1.2 per 10000 births among Caucasians, with approximately 50% of cases are bilateral.<sup>2</sup> Clubfoot deformity in children is difficult to treat because of the complex pathological anatomy of the growing foot.<sup>3</sup> The clubfoot is not a single bone deformity but it is varying combination of four basic deformities including hind-foot equines, varus, forefoot adduction and medial subluxation of navicular bone.<sup>4</sup> CTEV may occur as an isolated birth defect i.e. idiopathic or may be associated with other congenital deformities e.g. Edward syndrome, Spina bifida, Arthrogyposis, Meningomyelocoele and Cerebral palsy.<sup>5</sup> The deformity consist of four components including equinus, hind foot varus, fore foot adduction and cavus or medial subluxation of navicular bones.<sup>5,6</sup>

In Ponseti's technique, the first two casts are applied with the forefoot supinated so as to bring it into alignment with the hind foot.<sup>7</sup> The third cast is applied with the forefoot abducted and simultaneous counter pressure over the head of talus. In the fourth cast, the forefoot is further abducted. Prior to the fifth cast, the degree of dorsiflexion is assessed and if dorsiflexion is not possible beyond neutral, then a percutaneous Achilles tenotomy is required. Congenital Talipes Equino Varus is a matter of concern for the parents as well as to treating doctors because clubfoot needs early treatment and strict follow-up<sup>8</sup> to achieve satisfactory end results at adolescent. The goal of treatment is to reduce or eliminate these four deformities so that the patient has a functional, pain free, plantigrade foot, with good mobility and without calluses, and does not need to wear modified shoes.<sup>8</sup> The Ponseti technique is based on a thorough understanding of the anatomy and pathology of Congenital Idiopathic Clubfoot it involves a fairly small number of manipulations (between five and seven) and usually requires performing an Achilles

tendon tenotomy under local anaesthesia<sup>9</sup>, later on Denis Brown shoes were advise. Looking at the local and international literature which shows Ponseti's method is safe and effective mode of treatment and radically decrease the need for extensive corrective surgery.<sup>10</sup> Study conducted by Sharma has showed effectiveness of Ponseti method in congenital club foot to be 95%.<sup>4</sup> A local study by Iqbal J has evaluated effectiveness of Ponseti method in congenital club feet children under one month.<sup>7</sup> We designed this study to save the time by reducing the number of casts as advised by Ponseti and money of this resource deprived country and prevent the long term sufferings and complications of the morbidity and other methods. In comparing the conservative and operative methods of treatment, literature reveals that the conservative method i.e. Manipulation and serial casting produces lower or no complication, less pain and better function.<sup>11,12</sup> The conservative method is found to have impressive short and long term results to the tune of 90%.<sup>13</sup> This study aims to assess the anatomical correction with cosmetic and functional outcome of the Ponseti method in Congenital "Talipes Equino Varus" under 12 months of the age.

**MATERIALS AND METHODS**

This experimental study was contains 50 cases of congenital talipes equino varus "CTEV" and was carried out in the department of Orthopaedic and Traumatology of Liaquat University of Medical and Health Sciences Jamshoro/Hyderabad, with the duration of two years from 21-01-2009 to 20-01-2011. In this study all the case were selected with age of one year from the birth with congenital "talipes Equino Varus". All the cases with Acquired "Talipes Equino Varus", atypical foot, "talipes Equino Varus" with Arthrogryposis Multiplex Congenital, talipes Equino Varus" previously treated by method other than ponseti technique were excluded from the study. The Data was entered and analyzed in statistical program SPSS version 16.0. Simple frequencies and percentages of categorical variables such as gender, estimated growth, placental localization, medical disorders, any addiction, hospitals, place of delivery, mode of delivery, deformities, severity of clubfoot, procedures, complications, final outcome, were calculated. No statistical test was applied for any comparison.

**RESULTS**

Total 50 cases of congenital Telipase Equino Varus (CTEV) having 77 feet were analyzed in this study based on inclusion criteria. Out of 50 cases, 32(64.0%) were males and 18(36.0%) were females (male female ratio 1:7). Out of 50 cases, 27 (54.0%, n = 50) had bilateral (54 feet) deformities and 23 (46.0%, n = 50) cases were unilateral deformities. Of these, 13 were on left side and 10 on right side. The parents of the patients

with unilateral deformity were informed about possible foot length differences and atrophy in leg muscles. Table No.1

Severity was assessed according to Pirani Scoring system. In the present study, out of total 77 feet, 48 (62.0%) had severe foot deformity while 29(37.60%, n = 77) patients had moderate foot deformity. Chart No. 1.

All the cases were initially treated by POP casting. Percutaneous Achilles tenotomy was performed in 53(68.8%, n = 77) patients. Chart No.2.

Out of 77 feet, rocker bottom foot deformity developed in 03 (3.8%) feet, increased stiffness of ligaments and joints occurred in 1(1.2%, n =77) foot while vascular complications like skin ulceration and necrosis was observed in 1(1.2%, n =77) feet. At the end of 2 to 3 years follow-up period, in 72 (94.0%, n = 77) patients congenital clubfoot deformities were corrected successfully by using Ponseti method while 05 (6.0%, n = 77) patients were not fully corrected due to other complications. Table No. 2.

Table No. 1 base line charecteristics of the patients (n = 50)

	Number	Percentage
Gender Distribution		
Male	32	64.0%
Female	18	36.0%
Frequency of Deformidities		
Bilateral	27	54.0%
Unilateral:	23	46.0%
- Left	13	43.5%, (n = 23)
- Right	10	56.5%, (n = 23)

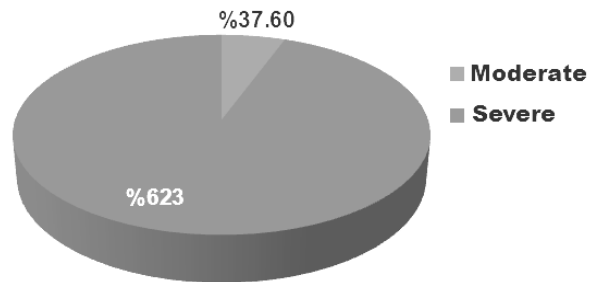
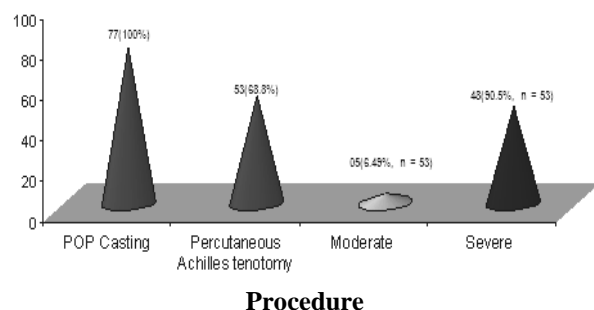


Chart No. 1: Severity of clubfoot (n = 77)



Case No.2: Details of Procedure Performed (n = 77)

**Table No. 2: Complications and Outcome of Treatment (n = 77)**

	Number	Percentage
<b>Complications</b>		
Rocker bottom feet	03	3.8%
Increased stiffness of ligaments and joints	01	1.2%
Vascular complications	01	1.2%
<b>OUTCOME</b>		
Corrected	72	94.0%
Failure	05	6.0%

## DISCUSSION

Clubfoot or congenital talipes equinovarus is a complex deformity of foot that requires meticulous and dedicated efforts on the part of the treating physician and parents for the correction of the deformity. Idiopathic clubfoot has been documented as a hard and frustrating deformity to treat.<sup>14</sup> Ponseti treatment for clubfoot has been gaining popularity due to the good results demonstrated by Ponseti and other institutions.<sup>15</sup>

In this series, 64.0% were male and 36% were female. The male to female ratio is high (male: female, 1:7) in comparison to the series of Gupta A et al.<sup>16</sup> who showed the slightly higher frequency of gender in his study i.e. 81% male and 19% female while Khan NU et al.<sup>17</sup> reported the 60.3% male and 39.7% female which is similar to this study. In a local study conducted by Arif M. et al.<sup>18</sup> described 53.3% male and 46.7% female out of 30 cases of congenital talipes equinovarus (clubfoot), this difference is because of small sample size. Palmer<sup>19</sup> explained this by suggesting that females require a greater number of predisposing factors than males to produce a clubfoot deformity. Social bias and increased attention towards males in our region can account for the higher incidence in males in our study. The order of birth also seemed to have an influence on the occurrence of clubfoot, with 65% of cases in the first-born child, which is in accordance with various other studies.<sup>20,21</sup>

In the present study, out of 50 children, 54.0% had bilateral clubfoot and 46.0% had unilateral clubfoot (13 on left side and 10 on right side). Khan NU et al.<sup>17</sup> involved 48.9% children having bilateral clubfoot and 51.0% had unilateral clubfoot out of 141 patients, this less difference is due to large sample size of the study. Gupta et al.<sup>16</sup> showed similar results i.e. 60% children had Bilateral clubfoot while 40% had unilateral clubfoot in his stud on 96 patients.

The Ponseti method of conservative clubfoot treatment is an excellent method of club foot treatment, of which there have been successful results in western countries.<sup>21, 22, 23, 24</sup>

In this study reporting early results of the Ponseti treatment, 92% of the deformities were corrected without need for extensive surgery. This recovery rate is consistent with the results, reported by Herzenberg et al.<sup>21</sup>, whose study included similar population and follow-up. Another study by Goksan SB et al.<sup>27</sup> recovery rate was 95% which is similar to this study.

The duration of casts in this study for more than 70% of feet was five weeks or (3 to 8). The duration decreased over time as we mastered the technique and started getting faster correction. Ponseti et al.<sup>25</sup> reported five–12 weeks' duration of casts (average, 9.5 weeks). In another study by Laaveg et al.<sup>20</sup>, the average duration was 8.6 weeks whereas Gupta A et al.<sup>152</sup> also observed that the duration of casts for more than 85% of feet was five weeks or less which correlate to this study. The duration decreased over time as we mastered the technique and started getting faster correction. These findings correlate well to the study of Gupta A et al.<sup>16</sup> Ponseti et al.<sup>25</sup> reported five–12 weeks' duration of casts (average, 9.5 weeks). In another study by Laaveg et al.<sup>20</sup>, the average duration was 8.6 weeks. Morcuende et al.<sup>23</sup> reported an average time from the first cast to tenotomy as 16 days for one group and 24 days for another group in the same study.

The Ponseti method<sup>26</sup> of correction of clubfoot deformity requires serial corrective casts with long-term brace maintenance of the correction. In this study reporting early results of the Ponseti treatment, 92% of the deformities were corrected without need for extensive surgery. This recovery rate is consistent with the results, reported by Herzenberg et al.<sup>21</sup>, whose study included similar population and follow-up. An other study by Goksan SB et al.<sup>27</sup> recovery rate was 95% which is similar to this study.

## CONCLUSION

In conclusion, the Ponseti method is a very safe, efficient treatment for the correction of clubfoot that radically decreases the need for extensive corrective surgery. Furthermore, it can be used successfully in children especially when no previous surgical treatment has been attempted. The decline in extensive clubfoot surgery should encourage national efforts to make this method the gold standard in the treatment of congenital idiopathic clubfoot. Educational programs should be targeted to primary care physicians, pediatricians, gynaecologists and lady health workers to increase awareness of the Ponseti method and its excellent results, so that they can advise families accordingly. It is advised that the treatment of club foot should be started within few days of birth to achieve best results. Orthopedicians who adopt the Ponseti method will feel rewarded by the satisfaction of successfully correcting what traditionally has been a very frustrating deformity to treat.

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