Original Article

Early Results of Ponseti Technique for Idiopathic Congenital Talipes Equinovarus

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ABSTRACT

Clubfoot or congenital talipes equinovarus is one of the most common congenital anomaly affecting the lower limb. The exact cause is unknown and a number of theories have been postulated to explain its origin. Congenital talipes equinovarus affects both sexes and may be unilateral or bilateral. Clubfoot is sometimes associated with Arthrogryposis multiplex congenita, spina bifida, meningomyelocele and muscular dystrophies.

Objective: This study was conducted to determine the early results of ponseti technique for idiopathic congenital talipes equinovarus.

Study Design: Observational (Follow-up) Study.

Place and Duration of Study: This study was conducted at orthopedic B-Unit of Ayub Teaching Hospital Abbottabad from 1st April 2009 to 30th September 2009.

Materials and Methods: Thirty (30) patients from either gender with age from birth to 06 months of age attending the outpatient department of Orthopedic B-Unit of Ayub Teaching Hospital Abbottabad were included in the study.

Results: The patients were ranged in age from birth to o6 months of age, with 17 male (56.7%) and 13 female (43.3%). In our series on follow up, fore foot adduction was detected in 06 cases (20%) and 02 cases had equinus relapse (6.7%) and 03 patients had residual equinus (10%) while bilateral residual equinus was detected in 01 patient (3.3%) and 01 patient had recurrence of deformity (3.3%) for which posteromedial release was done.

Conclusion: We concluded that the Ponseti method is a reliable, simple, effective and safe method for the treatment of idiopathic clubfoot deformity.

Key Words: Clubfoot, Ponseti casting, results, Talipes equino varus, CTEV

INTRODUCTION

Congenital tallipes equinovarus is one of the most common human congenital malformations[1]. Its incidence is approximately 01 in every 1000 live births[2]. The word tallipes means talus (ankle), pes (foot). The word clubfoot denotes the club like appearance of foot, where the patient walks on outer aspect of talus.CTEV describes the end results of untreated deformity of foot.CTEV is hereditary foot deformity of unproven etiology, which affects both sexes, but males more frequently than females. The condition may be unilateral or bilateral. It is often associated with other conditions such as Arthrogryposis multiplex congenita, spina bifida, meningomyelocele and muscular dystrophies[3].

. There is an increased incidence in certain racial and ethnic groups with much higher incidence if the patient has a positive family history of clubfoot.

CTEV has following components[4]:

1. Equinus; the forefoot is dropped planter wards at ankle and heel cord is tight. At mid tarsal level planter structures are tight.
2. Varus of the heel; It is due to the tight medially inserted heel cord and medially contracted ligaments which resist correction.
3. Adduction or varus of forefoot.
4. Supination; It is rotation about the longitudinal axis of foot with elevation of medial boarder.

The anterior and posterior tibial muscles pull the first metatarsal and navicular in to inversion. In addition the contracted planter aponeurosis and muscles create the cavus deformity. The anterior end of talus forms the dorsal and lateral bony deformities. In addition abnormal skin creases of foot and calf muscle atrophy may also be present. Mid foot & fore foot are adducted & inverted. Foot & leg have a golf club stick like appearance.

The severity of deformity in clubfoot can be assessed by various methods but a number of criteria one of which is Pirani scoring system. The pirani scoring system, together with the ponseti method of clubfoot management, is reliable, quick and easy to use method for clinical assessment of an Individual clubfoot[5].

The pirani score comprises six clinical signs, three in midfoot and three in hind foot. The amount of deformity is graded between 0 and 3. The score 0 is for normal, score 0.5 is for moderately abnormal and score 1 shows severe abnormality. The three signs that comprise midfoot score are (1) Curved lateral boarder (2) Medial crease (3) Talar head coverage. The three signs that comprise the hind foot score are (1) Posterior crease (2) Rigid equinus (3) Empty heel.

The importance of clubfoot and its conservative management has increased in past recent years.

Regarding treatment most of the authors agree that the appropriate initial management for all children with clubfoot is non operative[6]. Ponseti technique is a well proven way of managing clubfoot deformity[7]. Ponseti method has been shown to be affective in children up to two years of age[8]. The key principles of this method are

1. All deformity components are corrected simultaneously except equinus, which is corrected at last usually by percutaneous Achilles tenotomy.
2. Correction is maintained by external foot rotation around the head of talus.
3. Extra cavus is corrected by supination of the first ray of foot.
4. The corrections are performed weekly and plaster cast is applied.

After 04 to 05 weeks of treatment, a percutaneous Achilles tenotomy is performed under local or general anesthesia.. After another 03 weeks of immobilization in a plaster cast, the feet are given an abduction brace, worn continuously for three months and then at night for 02 to 04 yrs.9.

Clubfoot results in severe handicap unless managed early (Fig 1). Untreated patients not only develop progressive increase in deformity associated with late adoptive changes, but also result in poor function and cosmetic even after surgical correction.

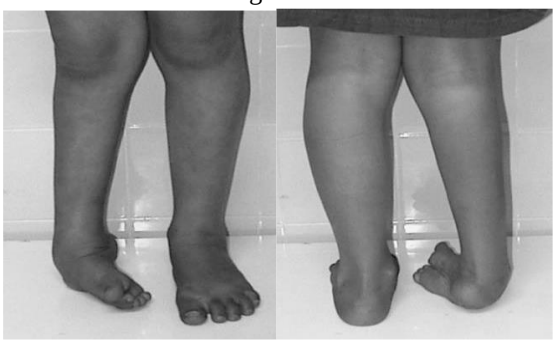


Figure No.1: Photographs of an eight-year old girl with a) right neglected club foot with atrophy of the calf muscles and severe deformity with weight bearing on the lateral aspect of the foot causing thickening of the skin and bursitis, b) severe varus of the heel and supination of the foot

MATERIALS AND METHODS

This follow-up study was conducted at OPD in orthopedic unit of Ayub Teaching Hospital, Abbotabad from April 2009 to September 2009. Thirty consecutive patients of age from birth six months were enrolled in this study. Previously operated cases or patients Clubfoot associated with other congenital anomalies like Arthrogryposis multiplex congenital, Meningomyelocele and Spina bifida were not included in study.

Initial Assessment:

All the patients attending the outpatient department of the orthopedic unit with idiopathic congenital tallipes equinovarus meeting inclusion and exclusion criteria were included in study. An informed consent was taken from the patient's parents or attendants. Detailed patient history especially about the family history and parent marriage (cousin or non relative) were asked. A detailed clinical examination was performed, starting from feet for cavus, heel varus, fore foot adduction and equinus of hind foot. Movements of the ankle, knee joint and hip joint of both limbs were also assessed. In addition the spine and the head were also examined. The deformity was classified according to Pirani scoring system.

Ponseti Management:

Patients of idiopathic congenital clubfoot were taken to plaster room along with their parents or attendants. The patients were put in a spine position on a comfortable couch. All the necessary arrangements were made for application of plaster cast, such as arrangement of cotton roll and plaster of Paris and a bowel full of water. The child was allowed to feed before and during the application of POP casts.

A thorough examination of the feet was done. The degree of severity was assessed according to pirani system and all the findings were noted down on the preformed. After that the diseased foot was manipulated for 60 seconds in desired position according to the number of cast, i.e. supination position for the first cast and abduction for second to fourth casts and abduction and dorsiflexion for fifth (post tenotomy) cast.

After manipulation for 60 seconds, an assistant was holding the foot in position for application of plaster cast while surgeon was applying the cast. The cast was applied from foot to mid thigh (above knee) of the involved foot at once in small children. The cast was applied in two steps in some patients with big legs and feet, first from foot to below knee and then from below knee to mid thigh above. In every cast care was taken to keep the knee joint in flexion from 10 degrees to 15 degrees. The foot was held in a desired position for that particular cast until the wet plaster cast gets dry and hardened and holds the foot in that particular position.

After that the fingers of the foot on which the plaster cast was applied were cleaned with a water socked cotton swab and the fingers were checked for any discoloration or swelling. The parents were allowed to take their child and sit on a chair nearby for 10 minutes, during which time they were told to feed the child.

After 10 minutes, the fingers of the foot on which the plaster cast was applied was checked again for discoloration, congestion and swelling. In a very few cases, there was congestion and swelling after the application of plaster cast, for which the cast was removed and a new cast was applied to that foot in a

very careful manner avoiding any tightness in the course of the POP cast.

If there was involvement of the other foot as well, the whole process of manipulation and application of plaster cast was repeated.

Post Casting Management

After the application of POP cast, the child and the parents were told to wait for at least 10 minutes to check for any discoloration or swelling of the foot. If found satisfactory then the patient was allowed to go home with instructions regarding the care of the plaster cast and about complications of the plaster cast. The parents were educated regarding how to check the foot for complications of the plaster cast. The parents were instructed that if they find or suspect any complication, they must take the child back to hospital or nearby health facility as soon as possible. In addition, they were also given the contact number of the surgeon so that parents can take advice from the surgeon at any time.

First follow up visit was after two weeks to troubleshoot compliance issues. The subsequent follow up visits were at third month and then sixth month for assessing the correction or recurrence of a part or whole of the deformity.

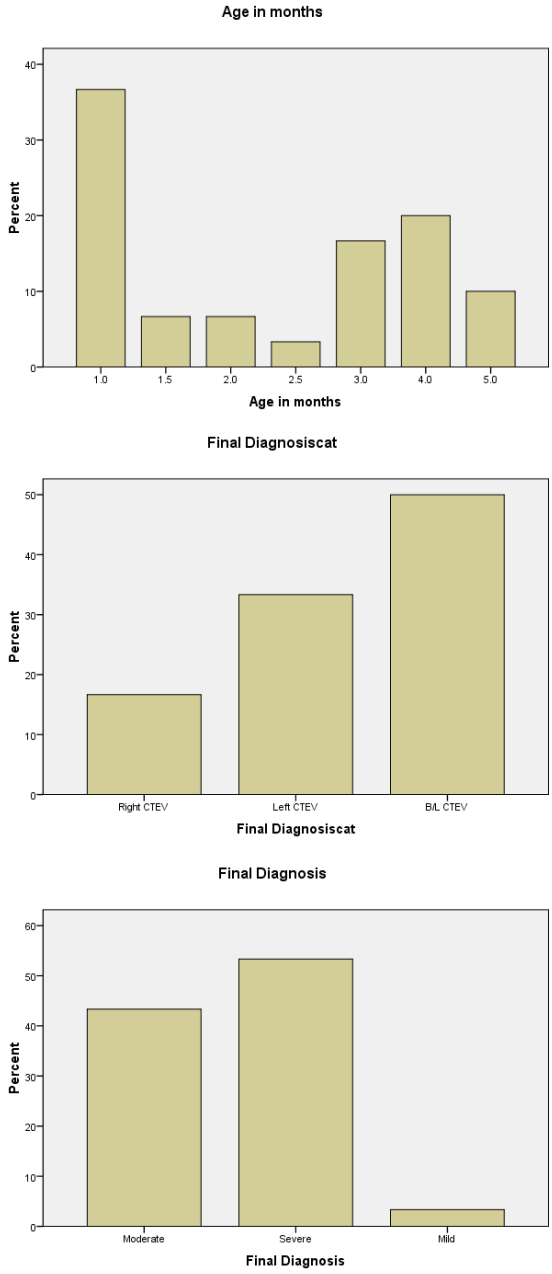
Figure No.2. Photograph showing the ankle foot orthosis used to maintain correction.

Data Analysis Procedure:

The collected data was entered and analyzed accordingly using SPSS version 11 through its statistical program. The study variables were age, sex, affected extremity, mode of injury and functional outcome. The continuous variables were expressed as Mean ± SD, whereas the categorical variables in the form of frequency and proportion.

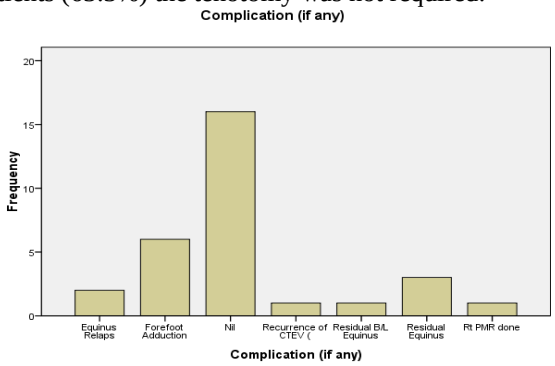
RESULTS

The patients were ranged in age from birth to o6 months of age, with 17 male (56.7%) and 13 female (43.3%). There were total 05 patients presenting with right C.T.E.V (16.7%), out of which 01 was male and the rest of four were female. There were total 10 patients presenting with left C.T.E.V (33.3%), out of which 07 were male and 03 were female. Bilateral C.T.E.V was present in 15 patients (50%), out of which 09 were male and the rest of the 06 were female. There was 01 patient with mild C.T.E.V (3.3%), while 13 patients had moderate C.T.E.V (43.3%) and the rest of 16 patients had severe C.T.E.V (53.3%).



The family history of C.T.E.V was positive in 10 patients with 08 patients have history of C.T.E.V in their cousins (26.6%) and 02 patients having history of C.T.E.V in their other relatives (6.7%). There were 20 patients (66.7%) having history of parent marriage between cousins, which means that both the parents

were cousins, while the parents of the rest of the 10 patients (33.3%) were not relatives. There were 20 patients (66.7%) who had no history of casting before starting ponseti treatment while the rest of the 10 (33.3%) had history of casts applied by other doctors. There were 11 patients (36.7%)in whom Achilles tenotomy was performed while in the rest of the 19 patients (63.3%) the tenotomy was not required.



In our series on follow up, fore foot adduction was detected in 06 cases(20%) and 02 cases had equinus relapse (6.7%) and 03 patients had residual equinus (10%) while bilateral residual equinus was detected in 01 patient (3.3%) and 01 patient had recurrence of deformity (3.3%) for which posteromedial release was done.

DISCUSSION

The method of serial manipulations and casting developed and mastered by Ignacio Ponseti at the University of Lowa in 1950 was instituted and applied to infants with congenital clubfoot in an effort to achieve a plantigrade, functional and a cosmetically acceptable foot without surgical intervention.

Since the early 1970s, there was a trend toward the surgical intervention in cases of congenital talipes equinovarus, primarily in the form of the posterior and medial soft tissue releases as described by Turco with modifications by Crawford et al and McKay[104]. However, extensive surgical release carries both immediate and long term inherent risks for example wound complications including infection, scarring, dehiscence, and neurovascular compromise may occur in immediate setting. Long term complications includes the overcorrection with calcaneus deformity, heel valgus, pes planus, forefoot abduction and under correction with persistent equinus, heel varus and metatarsus adductus may also occur. Because these complications become more readily evident, a renewed interested in non surgical treatment of C.T.E.V has occurred. This renewed interest has focused attention on the Ponseti method because of the previously reported high rates of success.

The goal of this research is to show the early results of ponseti technique for idiopathic club foot. We have been trying to define and correct therapeutic guidelines thereof in order to obtain patients better functional status (Fig 2) and, consequently, their better quality of life and work capability in future. The sample was homogenous in respect to the sex-age distribution, which minimizes the probability of making a statistical mistake.

In our study, there were with 17 male (56.7%) and 13 female (43.3%). There were total 05 patients presenting with right C.T.E.V (16.7%). There were total 10 patients presenting with left C.T.E.V (33.3%). Bilateral C.T.E.V was present in 15 patients (50%), out of which 09 were male and the rest of the 06 were female. There was 01 patient with mild C.T.E.V (3.3%), while 13 patients had moderate C.T.E.V (43.3%) and the rest of 16 patients had severe C.T.E.V (53.3%).

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In a study conducted by Michael and Matthew, 95% club feet were corrected without requiring PMR, while in our study 96.7% were corrected without requiring a posteromedial release[105]. In their study 28% were corrected with manipulation and casting alone while in our study 63.3% was corrected without requiring tenotomy. In their study only 5% required a posteromedial release while in our study only 3.3% required posteromedial release. In their study 67% of the clubfeet were corrected with serial manipulations and casting and with Achilles tenotomy while in our study tenotomy was performed in 36.7% of cases along with serial manipulations and casting. In their study 6 cases suffered a relapse despite initial successful correction, while in our study only 1 case suffered relapse of clubfoot deformity which favors our study. However in that case the parents admitted to noncompliance with the foot abduction brace regimen.

Limitations of this study include the relatively small number of patients and short follow up. In children who received previous casts, we were unable to verify

precisely what type of casting or treatment they received, and whether this treatment corrected any of their initial deformity or created an additional pathology. Most of the children took their children to traditional bone setters and only those consulted the hospital in which the deformity was severe.
However, a longer follow up study will show the functional outcomes of clubfeet treated by this method.

CONCLUSION

We concluded that the Ponseti method is a reliable, simple, effective and safe method for the treatment of idiopathic clubfoot deformity. On one hand, this treatment protocols leads to a reliable restoration of the clubfoot deformity to a functional, plantigrade and cosmetically acceptable foot in majority of our patient series. In most of cases, the need for posteromedial release was obviated and potential complications of the surgical procedures were avoided. On the other hand, timely treatment and an adequate therapeutic method can significantly reduce the risk of secondary and final complications and bring to satisfying quality of life and work capability

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