

Role of Ponseti Technique of Manipulation In Children with Idiopathic Club Foot Presenting After One Year Of Age. A Retrospective Study

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Abstract

Background: The Ponseti method of manipulation is accepted as a gold standard treatment for idiopathic clubfoot in infants. However, very few studies are available in literature on the use of this method in older children. The aim of this study is to determine the effectiveness of Ponseti manipulation technique in the treatment of late presenters of congenital idiopathic club foot deformity.

Material and Method: We retrospective evaluated the results of 23 children (15 males and 8 females) with 32 clubfeet deformity presenting after the walking age, which were treated with Ponseti manipulation. The outcome assessment was done by Pirani Score. Quantitative variables were expressed as mean \pm standard deviation and compared between initial and last follow-up scores using the paired *t*-test.

Results: The mean age at presentation was 3.4 (range 1 to 15) years. The mean pre-correction total Pirani score was 4.51 (range 2.5 to 6) which improved to mean post-correction total Pirani score of 0.55 (range 0 to 1). This difference was statistically significant ($p < 0.001$). In 95% of the feet, satisfactory correction of the deformity was achieved. The mean number of casts applied was 9.2 (range 6 to 16). The mean follow-up duration was 14.2 (range 2 to 21) months.

Conclusion: We conclude that the Ponseti technique of manipulation is an effective method for the management of idiopathic clubfoot deformity in older children as well.

Key words: Idiopathic club foot deformity, Ponseti technique, Pirani score.

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Introduction

Club foot (CTEV) is one of the most common congenital musculoskeletal defects which require correction [1]. Treatment of congenital club foot deformity has changed radically with the introduction of the Ponseti method in most centres worldwide. However, most of the studies on Ponseti method are done in infants or children before the walking age [1,2]. But, in our country, late presentation for the treatment for this deformity is common problem due to social stigma, lack of education & ignorance, poverty, lack of proper health services and

maltreatment. It often results in significant disability resulting in dependency for activities of daily living, significant financial and psychological impact on the family as well. Many patients with clubfoot end up living as beggars on the streets [3,4].

When the a CTEV child presents late after the walking age, the deformity becomes worse causing further contracture of the medial soft tissues and plastic deformation of bones, which makes treatment difficult. In the past decades many extensive soft tissue and bony surgeries

have been performed to treat such deformities, but the results were not very promising because surgeries were associated with many complications such as poor soft tissue healing and higher relapse rate [5,6]. Some studies have shown excellent role of Ponseti method of manipulation in late presenting walking child with club foot deformity [7-10]. Inspired by these, we retrospectively analysed our cases of late presenters of congenital idiopathic club foot deformity, which had been treated in the club clinic of our institution by Ponseti manipulation technique, with the purpose to assess the role of Ponseti method in neglected club foot.

Material and methods

We retrospectively reviewed the records of 29 patients of neglected club feet deformity who had been treated in the club foot clinic of Department of Orthopaedics, at our centre, from April 2015 to March 2018 by Ponseti method of manipulation after the institutional board approval. All children with idiopathic club foot deformity with age more than 1 year and had not taken any form of treatment previous and who were treated by Ponseti manipulation were included in the study. Secondary club foot, failed cases of previously manipulated or operated feet, atypical club foot, clubfoot deformity with ulcers over callosities for which cast could not be applied and children less than 1 year were excluded from the study. Thus after fulfilling the inclusion criteria, only 23 cases (32 clubfeet) were included and 6 were excluded from the study.

As seen from the treatment record and patient information sheet of the cases, parents of all the clubfeet children were found informed in their language, about the treatment protocol and all consented. All cases were initially evaluated by Pirani score to grade the severity of deformity [11]. Then they were treated by manipulation and regular serial weekly above knee cast application by with Ponseti's technique of manipulation [11]. All cases were asked to review weekly and regularly in CTEV clinics for re-manipulation.

The casting and manipulation continued till, the desired position of foot achieved i.e. able to abduct 40°, which is recommended for younger children, instead of the 70°, which is desired

position for infants [7]. The residual equinus deformity was corrected by a percutaneous tendoachilles tenotomy performed under local anaesthesia or short general anaesthesia in all patients. Following tenotomy, an above knee cast was reapply with foot in 10° dorsiflexion for 3 weeks in child less than 3 years and for 4 weeks in patients more than 3 years. A repeat tenotomy of was done in children where adequate dorsiflexion, i.e., at least 10° of dorsiflexion was not achieved even after one month of first tenotomy. In cases with residual cavus present, percutaneous plantar fasciotomy was done. After the deformity was corrected and cast removed, a foot abduction brace was prescribed to all patients for next 2 years. Initially the brace was worn for 23 hours a day for the first 3 months and after that brace wearing was done only during night time.

In our retrospective analysis we evaluated age at the time of presentation, severity of deformity by the Pirani score at initial presentation, change in the Pirani score after the final cast, the number of casts required to achieve full correction and any complications during the casting or bracing phase of the treatment. The quantitative variables were expressed as mean \pm standard deviation and compared between preoperative and postoperative follow-up using the paired *t*-test. Statistical analysis was performed and a *P* < 0.05 was considered statistically significant.

Results

23 children with 32 clubfeet deformity were included in the study. 9 had bilateral involvement whereas 14 had unilateral deformity (32 clubfeet). There were 15 male and 8 female patients.

The mean age at presentation was 3.4 (range 1 to 15) years. The mean pre-correction Pirani score was 4.51 (range 2.5 to 6). The mean post-correction Pirani score was 0.55 (range 0 to 1). This difference was statistically significant (*p* < 0.001). The mean number of casts applied to achieve final correction was 9.2 casts (range 6 to 16). In 95% of the feet, satisfactory correction of the deformity was achieved (fig 1). The mean follow-up duration was 14.2 (range 2 to 21) months. Percutaneous Achilles tenotomy was done in all cases to correct residual

equinus, whereas percutaneous planter fasciotomy was done in 6 cases for cavus.

Fig 1. Pre (a) and post (b) correction clinical photography of CTEV case of age 9 year with pirani score pre (6) and post correction (0.5)



Four patients developed erythema and slight swelling of the toes, and redness of the skin due to excessive pressure, for recasting was done. No infections, skin necrosis, neurovascular compromise or profuse bleeding after tenotomy were observed. No problems with healing were seen after the tenotomy, even in the oldest patients with age 15 year. Repeat Achilles tenotomy was required in 10 feet due to incomplete initial correction of equinus in 4 and recurrence of equinus in 6 feet. All of the parents were satisfied with the treatment offered to their child as appearance of the feet had been improved and children were able to wear normal shoes for the first time in their lives. Dynamic supination was present in four feet, but caused minimal disturbance of gait and hence was not treated.

Discussion

Neglected clubfeet deformity is a common problem in developing countries, like ours due to lack of awareness, poverty, insufficient medical facility and maltreatment. It cause considerable physical, social, psychological and financial burdens on the patient and their families [3,4]. The treatments of neglected clubfoot deformity in the past have been extensive soft tissue release surgery, osteotomies, and various types of fixators or arthrodesis. Long term results of these surgical procedures have shown poor results with complications like painful feet, arthritis, stiffness

of ankle and subtalar joint, and residual deformity [5,6,13-15].

A few studies, evaluating the use of Ponseti method in children with neglected clubfeet have shown promising results [6-9,16]. We have been treating the elder child of neglected CTEV with Ponseti manipulation and cast for years, but inspired by these series we also tried to review and evaluate our results of correction of clubfeet deformities in 32 feet (23 children) in walking age child with mean age 3.4 years (range 1 to 15) treated by Ponseti manipulation, retrospectively.

Fig 2. Pre (a) and post correction clinical photography (b & c) and x rays (d) of foot lateral view of CTEV case of age 15 years showing correction but with small size foot



In our study, mean pre-correction Pirani score of 4.51 improved significantly to mean of 0.55 post-correction ($p < 0.001$), which was in accordance with the reported series of Lourenço et al, Verma et al, Khan et al, Spiegel etc [6-9,16,17]. The mean number of casts in our study was 9.2 weekly casts, whereas is compared to studies by Khan et al (12.1 mean cast) and Verma et al (10 mean cast) [7,8]. But Lourenço et al due to the reason that they treated with biweekly casts mean number of cast was higher in their series [6], but it showed that weekly cast was as effective as biweekly cast. We also found that the higher the age at presentation higher number of cast are used to correct the deformity.

Since dorsiflexion is most difficult to achieve, especially in older children, which requires percutaneous tenotomy, hence we performed percutaneous tendoachilles tenotomy in all cases, which healed uneventfully in all cases even in an oldest patient with 15 year age. Further a repeat tenotomy was also required in 10 of our case for recurrence of equinus deformity without any open soft tissue release surgery.

Although, in our series we achieved painless, plantigrade, and cosmetically acceptable feet in all the cases, but the size of the foot even after correction remain bit smaller. This is probably because in older child towards the skeletal maturity, bony correction is difficult and soft tissue correction by casting results in a normal shaped foot but smaller foot. Bone could not remodel fully even though the foot gets corrected. The talar dome and naviculus remained flat and triangular respectively. This poor remodelling of bones of feet in such old

patient may have resulted in persistence of small sized foot (fig 2).

We have also observed that above knee plaster casts and abduction brace were poorly tolerated especially by older children that could have been a risk factor for noncompliance and failure of treatment, but this issue had been dealt with adequate and proper parent's education and counselling. Despite these difficulties, the patients and parents were satisfied with the results.

Conclusion

Ponseti's method is a safe, effective and inexpensive method for correction of deformity even in neglected clubfoot deformity child presenting after the age of walking, however, our study is small and further studies will be necessary to understand the effectiveness of this method fully.

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