

MANAGEMENT OF CLUB FOOT BY PONSETI METHOD: OUR EXPERIENCE

Muhammad Salim, Mamoon Ahmed*, Muneeb Ur Rehman**

Rawal Institute of Health and Sciences Rawalpindi Pakistan, *Army Medical College/National University of Medical Sciences (NUMS) Rawalpindi Pakistan, **Combined Military Hospital Lahore Pakistan

ABSTRACT

Objective: To present our experience of treating the club foot with the Ponseti way of conservative management.

Study Design: Cross-sectional prospective study.

Place and Duration of Study: Study was carried out at CMH Sialkot and CMH Rawalpindi, from Jun 2012 to Jun 2015.

Material and Methods: A total of 39 children were treated by the same surgeon and 35 cases were included in this study. Ponseti method involves the non-surgical management of clubfoot, involving manipulation and casting techniques. The foot is systematically stretched as per Ponseti method into the normal shape and repeated casts are applied. Equinus is later treated by percutaneous tendoachilles tenotomy if required.

Results: Our aim was over correction of the deformity before advising for foot abduction brace. Thirty one (88.57%) cases showed excellent results while we faced difficulty in achieving the required aim in 4 (11.43%) cases.

Conclusion: Ponseti clubfoot management technique has reduced the need for extensive soft tissue release and major clubfoot surgery. This technique has been successful in our setup too. We recommend that it may be adopted as the gold standard for clubfoot treatment throughout the country and primary health care physicians should also be trained in this technique so that maximum people may benefit from this.

Keywords: Achilles tenotomy, Clubfoot, Ponseti.

This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

INTRODUCTION

Clubfoot is a deformity in which the infant's foot is turned inward often to the extent that the plantar surface of the foot faces inwards or sometimes upward. It is quite a common abnormality as around 1,50,000 to 2,00,000 children with clubfoot are born each year worldwide¹. It is the most common congenital abnormality and is also more common in developing compared to developed nations, as more than 80% of these affected babies are born in underdeveloped or developing countries. Recent studies acknowledge the fact that illiteracy and poverty are some reasons due to which some affected children may remain neglected and it becomes more difficult to treat the deformity². Clubfoot is not an embryonic anomaly as it usually develops during second trimester of fetal development. Likewise this

malformation cannot be diagnosed via ultrasonography until 16th week of gestation; therefore clubfoot should be considered a developmental malformation³. Dr Ponseti described this management technique more than fifty years ago and he himself treated hundreds of affected children successfully. Ponseti started this method of conservative treatment of clubfoot in 1950's, but this treatment remained largely confined to his own set-up in Iowa till 1997, when he published his book on this technique. Before this book was published, clubfoot was treated by complex surgical procedures which had a lot of complications like joint stiffness, pain, overcorrection along with high rates of recurrence^{4,5}. Tarsus are the most deformed bones in clubfoot. The cartilaginous tarsal bones are in extreme positions of adduction, inversion and flexion while the talus is severely plantar flexed; its head is wedge-shaped and the neck is plantarly and medially deflected. Navicular is medially displaced, articulating with the medial surface of the head of talus. Calcaneus bone is

Correspondence: Dr Muneeb Ur Rehman, House Officer, Combined Military Hospital Lahore Pakistan

Email: muneeb365@gmail.com

Received: 26 Feb 2017; Revised received: 22 May 2017; accepted: 27 Jul 2017

adducted and its anterior portion lies under the head of the talus. This leads to equinus and varus deformity of the heel³.

Ponseti method is a non-invasive technique involving weekly stretching of the deformity followed by application of long casts. This rectifies almost all the anomalies except the foot equinus which may later be treated by percutaneous tendoachilles tenotomy. All doctors agree that clubfoot should be tried to be managed non-operatively and hence surgery is regarded as the second line of treatment⁶. Different success rates are reported in the literature with variable chances of recurrence⁷⁻⁹. Clubfoot must be treated to prevent walking difficulties later in life. If effective treatment is provided, then majority of children enjoy normal life with minute traces of abnormality. The aim of the treatment is to provide pain-less mobility to the patient with a plantigrade foot, and without a need to wear the special shoes. Failure to achieve this goal leads to a surgical intervention to correct the disorder. Hence our study aimed at evaluating the efficacy of Ponseti method to treat the congenital idiopathic clubfoot in our set-up. The aim of this paper is to present our experience of treating the club foot with the Ponseti way of conservative management.

MATERIAL AND METHODS

It was a cross-sectional prospective study carried out in Combined Military Hospital (CMH) Rawalpindi and CMH Sialkot from June 2012 to June 2015. We treated 39 patients, out of which 35 were included in this study, after taking an informed consent. Sampling technique was non-probability convenient sampling. Bio-data, birth history, clubfoot pattern, body side, laterality (unilateral/ bilateral), age at onset of treatment, total numbers of casts applied, care cost (low or high) and treatment complications of all patients were documented. All new cases under three years of age were included in the study. All patients with a minimum follow-up of three months post last casting were included. Patients suffering from rigid club foot or those

who presented after 03 years of age were excluded from this study. Patients suffering from arthrogryposis multiplex congenital or having insensate foot were also excluded. Ponseti method involves the technique of gentle stretching and casting to treat this deformity. Treatment is started as early as possible. The infant's foot was gently stretched and then manipulated to the normal position by casting. Long cast, toes to thigh, were mostly used and this process of stretching, re-positioning and casting was repeated every week till the foot showed marked improvement. Foot is manipulated from adduction, inversion and flexion into abduction and extension (figure). First of all the head of the talus was exactly located. For this, malleoli were palpated with thumb and index finger of one hand while metatarsals and toes were held with the second hand. Next, the thumb and index finger of first hand were slid forward in front of the ankle to palpate the head of the talus. In front of the malleolus, we could easily feel the lateral part of talar head. This was due to the fact that tuberosity of medially displaced navicular is almost in contact with the medial malleolus in a clubfoot deformity. After locating the head of talus, which acts as a fulcrum of correction, the foot was abducted beneath the stabilized talar head. All components of clubfoot deformity except ankle equinus were corrected at this point.

The cavus deformity was corrected by putting the forefoot and the hindfoot in proper alignment. Pronation of forefoot in relation to hindfoot results in cavus deformity. The forefoot was supinated to form a normal appearing arch. Production of normal arch was necessary to correct the adductus and the varus. The foot was manipulated and heel was not touched to allow the calcaneus to abduct the foot. The toes were held, to maintain the position of the foot, by applying counter pressure against the head of the talus, as the casts made of plaster material were applied. The cast was first applied below the knee and then extended towards the upper thigh. The plaster was later molded over the head of the

talus. The arch was also molded properly to avoid flatfoot. The heel was molded by countering the plaster over posterior tuberosity of calcaneus. It was ensured that molding was a dynamic process so as to avoid excessive pressure over any single site. Most infants needed a percutaneous tendoachilles tenotomy to correct the equinus caused by continuous stretching of the Achilles tendon. This procedure needs a small incision and hence sutures are not required. A new cast was applied till the tendon healed. Most often this required almost three weeks and a tangible improvement of clubfoot was observed when the cast was removed, as the Achilles tendon regrew to a proper, longer length. Serial casting was done. In order to prevent a recurrence, proper bracing was done even after

room and last cast for 3 weeks was applied. We tried to provide 70° abduction and 20° dorsiflexion, of these, 7 (20%) were treated in CMH Sialkot and belonged to district Sialkot while the remaining 28 (80%) cases were treated in CMH Rawalpindi, most of whom belonged to district Rawalpindi, northern Punjab, Azad Kashmir and Gilgit-Baltistan. A minimum of 3 and maximum of 10, with an average of 6 POPs had to be applied to achieve the desired results. The POP regimen had to be revised in one (2.9%) case. Over a period of two years, no patient reported back with reversal of symptoms.

DISCUSSION

Ponseti method has now become the gold standard for the treatment of clubfoot since it



Figure: Ponseti method involves manipulation of foot from being adducted, inverted and flexed to being abducted and extended.

the procedure was successful. Hence, we also advised foot abduction brace to all the patients after the treatment. For data analysis, we used the statistical package for social sciences (SPSS) version 15 (IBM Chicago, Illinois, USA).

RESULTS

Out of the 35 cases included in this study, 31 (88.57%) cases showed excellent results while there was a difficulty in achieving the aim in 4 (11.43%) patients. These 4 patients had their percutaneous tenotomy, which was performed 7-10 mm above the calcaneus. It was carried out under local anesthesia in the minor procedures

was started by Dr Ponseti in USA over half a decade ago. Its success has extensively been published in the literature, leading to increased use of this technique throughout the world. Due to its high efficacy, low cost and low rates of complications, it is used in 113 of 193 United Nations members¹⁰. This study shows that congenital clubfoot can successfully be treated by the non-surgical Ponseti method with quite less chances of recurrence. This can avoid extensive surgeries to treat the malformation. We also noted that this procedure can easily be performed on children up to three years of age. A previous study carried out in USA¹¹ studied the outcomes

of this method in children up to two years of age and reported no significance of age on the outcome of this treatment. Our study seconds the stance, provided there is no other abnormality in the patient. During the manipulation, some doctors may apply counter-pressure on the calcaneocuboid joint, which may be the main reason behind the failure of the treatment or recurrence of the deformity. This prevents the movement of calcaneus under the talus, which is a fundamental motion for the correction of deformity. As the three tarsal bones move together, the pressure on calcaneocuboid joint in turn prohibits the motion of talonavicular joint. This makes it impossible to rectify the clubfoot. Similarly, application of extra force to treat the deformity also leads to failure in achieving the desired results. This extra force leads to pain and crying, which causes muscle stress in lower extremities, making manipulation and casting difficult^{12,13}. The wrong action also increases the cavus by jamming the anterior tuberosity of the adducted calcaneum against the undersurface of the head of talus. Ponseti method has a high success rate but sometimes it may require the parents' perseverance and faith that this technique is the gold standard. The complex surgical procedure may lead to circulation issues says an orthopedic specialist. Generally a child has to visit every four to seven days for casting. The feet are gently set into proper position and then a fresh plaster cast is given. The Achilles tendon is snipped just before the last cast¹³.

Many parents are worried if their child will achieve the normal walking capability even after the treatment or not. There are a variety of factors which can affect the outcome of treatment and one of them is the age at which the treatment is sought. We included children up to three years of age in our study and all of the children had equivalent chances of the treatment's success, independent of the age at which the patient reported. Similarly, the parents also inquire about the age at which their child will start walking normally once treatment is provided. A study carried out in USA shows that a clubfooted child

successfully treated by Ponseti method, is expected to start walking two months later than a normal child¹⁴. As this technique provides a cost effective way of treatment and requires no special intervention, hence it can easily be used to treat the patients belonging to low socioeconomic status even in rural areas. A study carried out in Jamshoro, Pakistan also shows that this method of treatment has a high success rate even in relatively less developed set ups¹⁵.

Ponseti clubfoot management techniques have reduced the need for extensive soft tissue release and major clubfoot surgery. As this method of serial pop is inexpensive, effective and easy to learn by allied health professionals, so it is suitable for developing and underdeveloped countries too. Long term studies also show that it provides a pain free, flexible and a strong foot; hence it is regarded as the best treatment for clubfoot, both in developed as well as developing countries. The operative treatment should only be advised when deformity does not respond to conservative treatment by serial manipulation and casting or in a child with a significantly rigid clubfoot deformity. Surgery is also performed when the forefoot has been corrected by conservative treatment but the hind foot remains fixed in both varus and equinus or the deformity has recurred. Surgery in the treatment of clubfoot must be tailored to the age of the child and to the deformity which has to be corrected.

Ponseti method is in practice of more than a dozen orthopedic centers in Pakistan and senior consultants have been organizing workshops to train other doctors in this method. A good number of workshops by senior consultants have been carried out both in military as well as civil setups. Our study also proved that Ponseti method should be adopted as the gold standard in treating the club foot deformity. It can be carried out in small set ups too as it does not require special procedures. We propose that health professionals serving in rural areas should also be trained so that their respective population may also benefit from this procedure.

CONCLUSION

Ponseti clubfoot management technique has reduced the need for extensive soft tissue release and major clubfoot surgery. This technique has been successful in our setup too. We recommend that it may be adopted as the gold standard for clubfoot treatment throughout the country and primary health care physicians should also be trained in this technique so that maximum people may benefit from this.

CONFLICT OF INTEREST

This study has no conflict of interest to declare by any author.

REFERENCES

1. Globalclubfoot.org. Clubfoot | Global Clubfoot Initiative 2015.
2. Evans AM, Chowdhury MM, Kabir MH, Rahman MF. Walk for life-the National Clubfoot Project of Bangladesh: the four-year outcomes of 150 congenital clubfoot cases following Ponseti method. *J Foot Ankle Res* 2016; 9(1): 42.
3. Lynn Staheli. Clubfoot: ponseti management. Global HELP Organization, 2009.
4. Dobbs MB, Nunley R, Schoenecker PL. Long-term follow-up of patients with clubfeet treated with extensive soft-tissue release. *J Bone Joint Surg Am* 2006; 88(5): 986-96.
5. Dobbs MB, Morcuende JA, Gurnett CA, Ponseti IV. Treatment of idiopathic clubfoot: an historical review. *Iowa Orthop J* 2000; 20: 59-64.
6. Cosma D, Gheorghe N, Vasilescu D. The treatment of congenital clubfoot by ponseti method. *J Med. Ar* 2013; 16(1-4): 11-4.
7. Dragoni M, Farsetti P, Vena G, Bellini D, Maglione P, Ippolito E. Ponseti Treatment of Rigid Residual Deformity in Congenital Clubfoot After Walking Age. *J Bone Joint Surg Am* 2016; 98(20): 1706-12.
8. Engell V, Nielsen J, Damborg F, Kyvik KO, Thomsen K, Pedersen NW, et al. Heritability of clubfoot: A twin study. *J child orthop* 2014; 8(1): 37-41.
9. El-Sayed M. Ilizarov external fixation for management of severe relapsed clubfeet in older children. *Foot Ankle Surg* 2013; 19(3): 177-81.
10. Shabtai L. Worldwide spread of the Ponseti method for clubfoot. *World J Orthop* 2014; 5(5): 585-90.
11. Morcuende J, Dolan L, Dietz F, Ponseti I. Radical Reduction in the Rate of Extensive Corrective Surgery for Clubfoot Using the Ponseti Method. *Pediatrics* 2004; 113(2): 376-80.
12. Grayev AM, Boal DK, Wallach DM, Segal LS. Metaphyseal fractures mimicking abuse during treatment for clubfoot. *Pediatr Radiol* 2001; 31: 559-63.
13. Leary JO. Ponseti Method requires patience, perseverance of family 2015.
14. Zions L, Packer D, Cooper S, Ebramzadeh E, Sangiorgio S. Walking Age of Infants with Idiopathic Clubfoot Treated Using the Ponseti Method. *J Bone Joint Surg Am* 2014; 96(19): e164-e64.
15. Makhdoom A, Laghari M, Pahore M, Qureshi P, Bhutto I, Siddiqui K. Clubfoot treatment by Ponseti method. *JLUMHS* 2011; 10(02): 71-4.