Original Article

Short term outcome of congenital clubfoot treated by Ponseti method

Nasser Sarrafan[1], Seyed Abdolhossein Mehdi Nasab[2], Mohammad Fakoor[3], Amirhossein Zakeri[4]

ABSTRACT

Objective: To assess the effectiveness of the Ponseti technique in the treatment of congenital clubfoot in children in Ahvaz, Iran.

Methodology: The data of 42 patients (60 feet), who presented with clubfoot were treated with the Ponseti casting technique between October 2008 and November 2010 at Emam Khomeini Hospital, Ahvaz, south of Iran, were collected and studied retrospectively. The outcome was evaluated using the Pirani score for clubfoot. All the patients were followed up for 12 months.

Results: The mean age of patients was 3.7 days (ranged 1-24 days). The average time to achieve acceptable correction was 7.6 weeks (range: 6-10 weeks). Eight patients (10 feet) (16.7%) were not corrected with initial casting and required early surgery. Full correction was obtained in 34 patients (50 feet, 83.3%). Subcutaneous tenotomy of the Achilles tendon was performed in 36 feet (72%) and in 14 other feet it was not performed (28%). Tenotomy was performed more in children with higher Pirani score ($P<0.0001$), and those with sever clubfoot had more chance for surgery ($p<0.0001$).

Conclusions: The Ponseti casting technique is a safe and effective conservative treatment for clubfoot that decreases the need for surgical interventions. It is an easy method to be applied by most orthopaedic surgeons.

KEY WORDS: Ponseti technique, congenital clubfoot, Casting.

Pak J Med Sci April - June 2012 Vol. 28 No. 3 459-462

How to cite this article:

Sarrafan N, Nasab SAM, Fakoor M, Zakeri A. Short term outcome of congenital clubfoot treated by Ponseti method. Pak J Med Sci 2012;28(3):459-462

INTRODUCTION

Idiopathic congenital clubfoot is one of the most common abnormalities of the lower limb. It is the seventh most common congenital Birth defect and the first for the musculoskeletal system.[1] It is a complex deformity and its treatment may be associated with a variety of problems. This deformity consists of four components: forefoot equines, hindfoot-varus, and forefoot adductions and midfoot cavus deformities.[2] There is nearly universal agreement that the initial treatment of the clubfoot should be non-operative regardless of severity of deformity ponseti method[3] which involves serial corrective manipulation, a specific technique of the cast application; a specific technique of the cast application; and a possible percutaneous Tendo-Achillis tenotomy. The method has been reported to have short term success rate approaching 90% and long term results have been equally impressive.[4]

First, Ponseti and Smoley applied gentle manipulation, serial casting and abduction orthosis

1. Nasser Sarrafan, MD, Associate Professor of Orthopaedic Surgery,
2. Seyed Abdolhossein Mehdi Nasab, MD, Associate Professor of Orthopaedic Surgery,
3. Mohammad Fakoor, MD, Associate Professor of Orthopaedic Surgery,
4. Amirhossein Zakeri, MD, Resident of Orthopaedic Surgery,

1-4: Department of Orthopaedic Surgery, Emam Khomeini Hospital, Ahwaz Jundishapur University of Medical Sciences, Ahvaz, Iran.

Correspondence:

Dr. Seyed Abdolhossein Mehdi nasab,
E-mail: hmehdinasab@yahoo.com

* Received for Publication: October 16, 2011
* 1st Revision Received: November 17, 2011
* 2nd Revision Received: March 19, 2012
* Final Revision Accepted: March 22, 2012

for treatment of congenital clubfoot in 1963.[1] This technique was different from previous methods like Kit technique.[5] In Ponseti technique, in the first casting session, forefoot inversion, forefoot abduction distal to talus bone and simultaneously prevention of pronation and Achilles tenotomy are performed.[6,7]

Serial casting using Ponseti technique is an easy and effective treatment for idiopathic clubfoot. This disease is treated using weekly casting. The purpose of this treatment modality is to omit all components of clubfoot deformities to reach a painless plantigrade foot that is cosmetically and functionally acceptable. Nowadays, it is generally accepted that the treatment of clubfoot should be non-surgical (based on the severity of disease). Ponseti technique consists correcting serial casting, special casting technique and percutaneous Achilles tenotomy, if necessary. The success rate of this method has been reported 86% - 93%.[7,8] Non operative serial manipulation and casting as described by kite (1939) was used for a long time in the past 2 the reported success rate were only fair ranging from 11% to 58% ponseti method (1950)[1] of serial manipulation and casting has recently been used.[9] Ponseti claims to avoid open surgery in 89% of cases by using his technique of manipulatioin casting and limited surgery of two methods. ponseti has Detto out come.[10] There has not been a general consensus regarding clubfoot grading, but it has been classified as flexible and rigid talipes equinovarus deformity. This classification is required for treatment modalities and prognosis of the disease.[11,12] Pirani et al innovated a simple scoring system based on 6 clinical signs (contracture). Three clinical symptoms for midfoot included curved lateral border, medial crease and lateral position of head of talus. Three clinical symptoms for hindfoot included posterior crease, rigid equines and empty heel. The score are based on below: score 0: normal; score 0.5: moderate abnormality; score 1: sever abnormality. Thus, each foot can gain a midfoot score 0-3 and a hindfoot score 0-3 and a total score of 0-6.[13,14]

METHODOLOGY

In this prospective study, a total number of 42 patients (60 feet) with idiopathic congenital clubfoot who were treated using Ponseti casting technique in Emam Khomeini hospital, in Ahvaz, Iran between 2009 and 2010 were included. Corrective serial casting was performed subsequent to manipulation based on Ponseti technique. Treatment was started at the earliest after the referral using corrective manipulation, without general anaesthesia and long leg casting. All the patients were followed up for 12 months.

In the beginning, cavus deformity was corrected using supination of the forefoot and dorsiflexion of the first metatarsus. In order to correct varus and adduction, foot was abducted while supinated with a direct pressure by hand on the head of talus bone. Long leg casting (7-8 totally) was repeated each week after corrective manipulation of the foot in each session. In the last casting session, foot was abducted about 70 degree and without pronation that was set in 15 degree dorsiflexion without a forceful manipulation, then a long cast was performed for about three weeks.

Finally, whenever there was not about 15 degree of dorsiflexion in spite of over 70 degree abduction of forefoot and correction of varus, under general anaesthesia percutaneous Achilles tenodon lengthening (ATL) was performed. After tenotomy, in order to achieve tendon repair long leg casting in 70 degree of abduction and 15 degree ofdorsiflexion was performed for three weeks. Outcomes were assessed and registered at pre and post treatment levels based on Pirani score. Criteria for success were defined as Pirani score ≤ 0.5. Data were analyzed using SPSS software version 13. This study was approved by Ethics committee at our university.

RESULTS

Out of 42 patients (60 feet), in 24 patients (34 feet, 56.6%) were male, and 18 patients (26. feet, 43.3%) were female. The mean age of patients was 4.8±3.7 days (range: 1-24 days). The mean age of girls and boys were 4.1±3.73 days and 5.4±3.69 days, respectively which showed no significant difference (P>0.05).

Among 24 treated patients 18 cases were bilaterally involved (8 girls and 10 boys) while 24 cases (10 girls and 14 boys) had unilateral clubfoot; in 13 cases left foot was involved and in 11 cases the right foot had clubfoot. Table-I, The mean time for correction of deformity was 7.6 weeks (6-10 weeks).

The success rate (Pirani score ≤ 0.5) was 80.9% (34/42 patients). Out of 60 treated feet, 50 feet had corrected using Ponseti casting (83.3%). Among 34 feet in boys, 28 feet showed an acceptable response to the treatment (82%). The success rate among girls was 85% (22/26 feet); this difference was not statistically significant (P=0.99).

The mean age of treated patients was 3.17±3.16 days, and the mean age of patients who underwent Achilles tenotomy was 9.4±6.45 weeks.

Table-I: Clinical finding of patients.

Variables	*Patient*	*Feet*	*Male*	*Female*
Total/Patient	42	60	24	18
Age = weeks			5.4±3.69	4.1±3.73
Right Foot			8	3
Left Foot			9	4
Bilateral			10	8
Total			27	15

The average Pirani score at admission time was 4.08±1 for all the patients (4.15 in girls and 4.29 in boys).At admission time the average Pirani score among patients who were successfully treated was 3.84±0.84 and the mean Pirani score among those who underwent surgery was 5.3±0.78, this difference was statistically significant (P<0.0001).

In the group who had successful treatment, the mean Pirani score among those who underwent ALT was 4.19±0.73 and the mean Pirani score among those who were treated without ALT was 2.92±0.33; this difference was statistically significant (P<0.0012). Table-II.

Table-II: Total initial Result's of patients based on Pirani score.

Patient's	*Pirani score*	*Male Foot*	*Female Foot*	*Total*
Total	4.08±1 Male: 4.29 Female: 4.15			
Success of Treatment	3.84±084	2%	85%	83.3%
ATL Group	4.19±073	24	12	36(72%)
No ATL Group	2.92±033	10	4	14(28%)
Surgery Group Posteromedial Relase	5.3±078	6	4	10(16.7%)

DISCUSSION

The appropriate treatment of idiopathic congenital club foot had been a matter of a healthy debate in the past. However the details of surgical operation have been explained, while techniques used for manipulation and their outcomes have not been widely assessed. The Pirani scoring system together with the Ponseti method of clubfoot management was assessed for its predicate value.[13] There was a significant positive correlation between the initial Pirani score and number of casts required to correct the deformity. The pirani scoring system is reliable, quick, and easy to use, and provides a good forecast about the likely treatment of the foot but a low score does not exclude the possibility that a tenotomy may be required.[9,10,15] Sanghvi et al in a comparative study reported that the Ponseti method can achieve more success rate than kite technique in congenital clubfoot (CCF).[16]

Chomiak et al treated 123 feet in 41 infants with CCF by Ponseti method from 2005-2007 and concluded that this technique was more efficient that the previous traditional methods.[17] Verma et al reported that the Ponseti method can be used in clubfoot patients more than six months age. In their study on 55 clubfeet, full correction was obtained in 49 feet.[18] Hamett et al compared the standard weekly casting versus 3 times cast per week with Ponseti method and concluded that results were the same.[19] Bensahel et al reported that infants with clubfoot treated by functional method had favourable results in 50% of the patients.[20] Herzemberg reported success was greater than 90%. However, consistent reproducibility of this rate has not been noted in many studies Ponseti described another fundamentally different casting technique.[21]

Other conservative modalities treatments like physiotherapy and frequent passive movements are not easy and the rate of surgery after such treatments has been reported from 32% to 95%.[22,23] In none of the mentioned methods, ATL has not been performed in the primary stages.[24] Mootha et al found 82.18% correction rate in 128 clubfeet treated by Ponseti method. They concluded that strict compliance is essential to prevent relapse of deformity.[25] In a study by Metthew B et al in 2004, 51 patients with idiopathic clubfoot were casted using Ponseti technique. Primary correction achieved in 100% of patients and the rate of patients required ALT was 86%.[26]

Marcuende JA et al in 2004 applied Ponseti technique in about 95% of patients with idiopathic congenital clubfoot and the rate of ALT was 86%.[27] in our patients Ponseti technique and applying ATL in appropriate time led to acceptable correction in 83.3% of cases with idiopathic congenital clubfoot. In a study by David M et al in 2004, 85% of patients with Pirani score ≥ 5 finally underwent ATL.[28] In our study, those with lower Pirani score showed better response to treatment and had less probability for further surgical intervention (P<0.0001). Meanwhile, our findings showed a lower need for ALT in patients with lower Pirani score (P<0.0001). Nowadays, in consistence with our findings, Ponseti technique is accepted as the Gold standard for idiopathic congenital clubfoot in a number of publications. Short-term outcome from our investigation has shown that Ponseti technique can be applied as the primary treatment of idiopathic congenital clubfoot. Long-term follow up is required

in order to assess recurrence rate and probable surgery. Our findings confirmed the superiority of Ponseti casting technique in treatment of idiopathic congenital clubfoot. The key points to reach success in this treatment are to make calcaneus straight to other parts of the foot under unfixed talus bone. If metatarsus is in pronation, correction using pronation will lead to cavus. Patients in younger ages had less need to surgical interventions and ALT, thus it is recommended to start casting using Ponseti technique as soon as possible. Based on the severity of deformity at the admission time, it is possible to explain disease prognosis and probability of surgery and even ALT to patients` parents.

A limitation of our study was that we followed the patients in a short time; it is suggested to evaluate outcomes in long term to assess the recurrence of deformities.

CONCLUSION

Results of the clubfoot treatment by Ponseti technique in our study have been good. This technique is a very safe efficient treatment for the correction of clubfoot and radically decrease the need for extensive corrective surgery and now all the patients with this deformity can be treated in our hospital by this technique.

ACKNOWLEDGMENT

We thank the research deputy of Ahvaz Jundishapur University of medical sciences because of financial support. (U-89-109)

REFERENCES

1. Diet FR, Dietz FR, Cole WG, Tosi LL, Carroll NC, Wemer RD, et al. A search for the gene(s) predisposing to idiopathic clubfoot. Clin Genet 2005;67(4):361–362.
2. Brand RA. Clubfoot: Etiology and treatment. Clin Orthop Relat Res 2009;467(5):1121-1123.
3. Laaveg SJ, Ponseti IV. Long term results of treatment of congenital club foot. JBJS Am 1980;62:23-31.
4. Porecha MM, Parmar DS. The predictive value of pirani scoring system in the management of idiopathic club foot by ponseti method: The Internet J Orthopaedic Surg 2009;11(2).
5. Kite JH. Non-operative treatment of congenital clubfoot. Clin Orthop Relat Res 1972;84:29-38.
6. James H. Beaty. Congenital Anomalies of The lower extremity in: S. Terry Canale, James H Beaty: Campbell's operative orthopaedics. 11 ed. Mosby 2008: 1076 -1086.
7. John Anthony Herring. TachdJian's pediatric orthopaedic. 4th ed. Saunders 2007: 1076-1086.
8. Abdelgawad AA, Lehman WB, Van Bosse HJ, Scher DM, Sala DA. Treatment of idiopathic clubfoot using the Poinsettia method: minimum 2-year follow-up. J Pediatr Orthop B 2007;16(2):98-105.
9. Porecha MM, Parmar DS, Chavda HR. Mid-term results of Ponseti method for the treatment of congenital clubfoot – (a study of 67 clubfeet with mean five year follow up. J Orthop Surg Res 2011;6:3.
10. Zimbler S. Non-operative management of the equinovarus foot long term results in Simons Gw editor. The clubfoot New York Springer Verlag 1994: 191-193.
11. Jowett CR, Morcuende JA, Ramachandran M. Management of congenital talipes equinovarus using the Ponseti method: a systematic review. J Bone Joint Surge 2011;93(9):1160-1164.
12. Wainwright AM, Auld T, Benson MK, Thealogis TN. The classification of congenital talipesequinovarus. J Bone Joint Surg Br 2002;84-B:1020-1024.
13. Bensahel H, Catterall A, Dimeglio A. Practical applications in idiopathic clubfoot. A retrospective multicentre study in EPOS. J Pediatr Orthop 1990;10:186-188.
14. Pirani S, Q Uterbridge HK, Sawatzky B, Stothers K. A reliable method of clinically evaluating a virgin clubfoot evaluation: 21th Sicot congress 1999.
15. Dyer PJ, Davis N. The role of the pirani scoring system in the management of club foot by the poinsettia method. J Bone Joint Surg Br 2006;88(8):1082-1084.
16. Sanghvi AV, Mittal VK. Conservative management of idiopathic clubfoot: Kite versus Ponseti method. J Orthop Surg (Hong Kong) 2009;17(1):67-71.
17. Chomiak J, Frydrychova M, Ostadal M, Matejicek M. The Ponseti method of treatment of congenital congenital clubfoot—first experiences. Acta Chir Orthop Traumatol Cech 2009;76(3):194-201.
18. Verma A, Mehtani A, Sural S, Maini L, Gautam VK, Basran SS, et al. Management of idiopathic clubfoot in toddlers by ponseti's method. J Pediatr Orthop B 2012;21(1):79-84.
19. Hamett P, Freeman R, Harrison WJ, Brown LC, Beckles V. An accelerated ponseti versus the standard ponseti method: a prospective randomized controlled trial. J Bone Joint Surg Br 2011;93(3):404-408.
20. Bensahel H, Guillaume A, Czukonyi Z. Results of physical therapy for idiopathic clubfoot: A long-term follow-up study. J Pediatr Orthop 1990;10:189-192.
21. Herzemberg JA. The Baltimore experience with the lowa (Ponseti) Technique hospital for joint Disease club foot workshop 25 April 2001 New York.
22. Dimeglio A, Bonnet F, Mazea, De Rosa V. Orthopedic treatment and passive motion machine: consequences for the surgical treatment of clubfoot. J Pediatr Orthop 1996;5-B:173-180.
23. Rijal R, Shrestha BP, Singh GK, Singh M, Nepal P, Khanal GP, et al. Comparison of Ponseti and Kite's method of treatment for idiopathic clubfoot. Indian J Orthop 2010;44(2):202-207.
24. Coper DM. Dietz FD. Treatment of idiopathic clubfoot. A thirty –year follow – up note. J Bone Joint Surg (Am) 1995;77-A:448-454.
25. Mootha AK, Saini R, Krishnan V, Bali K, Kumar V, Dhillon MS. Management of idiopathic clubfoot by the Ponseti technique: our experience at a tertiary referral centre. J Orthop Sci 2011;16(2):184-189.
26. Dobbs MB, Rudzki JR, Derek B. Factor predictive of outcome after use of the Ponseti method for the treatment of idiopathic clubfoot. JBJS 2004;86-A(1):22-27.
27. Marcuede JA, Dolan LA, Ponseti IV. Radical reduction in the rate of extensive surgery for clubfeet using Ponseti method. Paediatrics 2004;113(2):376-380.
28. Scher DM, Feldman DS, van Bosse HJ, Sala DA, Lehman WB. Predicting the need for tenotomy in the Ponseti method for correction of clubfeet. J Pediatr Orthop 2004;24(4):349-352.