

Outcome of Ponseti Casting in Syndromic Club Feet

Kashif Mahmood Khan¹, Pervez Ali², Saba Asghar³

¹Associate Professor and Head of Department, Department of Orthopedics, JPMC, Karachi

²Associate Professor, Department of Orthopedics, JPMC, Karachi

³House Officer, Department of Orthopedics, JPMC, Karachi

Authorship and contribution Declaration:

Each author of this article fulfilled ALL 04 Criteria of Authorship:

1. Conception and design of or acquisition of data or analysis and interpretation of data.
2. Drafting the manuscript or revising it critically for important intellectual content.
3. Final approval of the version for publication.
4. All authors agree to be responsible for all aspects of their research work

Corresponding author:

Dr. Kashif Mahmood Khan

E-mail: kashif2511@hotmail.com

ABSTRACT

Objective: To determine the effectiveness of Ponseti casting in syndromic clubfoot

Study Design: Quasi experimental study

Place and duration of study: Department of Orthopedics, from January 2020 to December 2021.

Methodology: Children of either sex, having clubfoot and other congenital abnormalities, less than one year age, without previous intervention with cast or surgical were included and with previous sessions of casting, previous surgeries, parents unwillingness were excluded. Photographs taken and Pirani score performed before start of casting. Weekly casting was done and documented. TA tenotomy was done in some feet and last cast performed. Last documentation and Pirani scoring was done. Follow up was done on 3 and 6 months. Recurrence and surgical procedure requirements documented. All data was compiled on SPSS version 20.

Results: 50 children were included. 35 males and 15 females. 40 bilateral and 10 unilateral feet. High Pirani scoring was recorded before Ponseti Casting. Different number of casts were required and TA tenotomies done. Pirani score showed improvement but requiring more casts that idiopathic clubfeet. Pre and post-Ponseti mean Pirani score was 4.05 (S.D: ± 0.82) and 2.0 (S.D: ± 0.5) respectively with statistical significant difference ($p < 0.001$). Twenty children developed recurrence and 10 required surgeries.

Conclusion: Ponseti casting is useful in syndromic clubfoot deformity correction. Requires more casts, difficult but corrects deformity to a significant extent and recommended to use.

Keywords: Ponseti casting, syndromic clubfoot, idiopathic clubfoot, Pirani score, TA tenotomy

This article may be cited as:

Khan KM, Ali P, Asghar S. Outcome of Ponseti Casting in Syndromic Club Feet. J. Pak. Orthop. Assoc. 2023; Vol. 35 (03):148-151.

INTRODUCTION

Club foot or Congenital Talipes Equinovarus (CTEV) is the most frequent congenital foot deformity^{1,2}. It is mostly isolated deformity but it can be associated with other congenital deformities as well³. Isolated deformities can be unilateral and bilateral but clubfoot associated with other congenital deformities or syndromic club foot is almost always bilateral. Congenital Talipes Equinovarus (CTEV) has been a significant treatment challenge. Syndromic club feet are difficult to treat than isolated club feet with less satisfactory results⁴. Many treatments have been tried with different outcomes⁵. Ponseti casting

revolutionized the management in simple and minimally invasive way, becoming a gold standard⁶ and giving excellent results. It has made surgical option almost obsolete now^{7,8}. Simple clubfeet are giving high percentile correction with Ponseti casting. Few castings can bring more than 90 percentile correction. Challenge is faced in difficult⁹ or syndromic feet, which are stiffer, more deformed and have associated abnormalities. They are hard to correct, require more casting¹⁰, more TA tenotomy rate, less success rate, have a high recurrence rate, and required additional surgical procedure, soon after casting or later to achieve significant correction¹¹. Compliance of child and parents is difficult in such

conditions, affecting the over all outcome of the management.

METHODOLOGY

Study was carried out in Department of Orthopedics from January 2020 to December 2021. All children of either sex, having club foot and other congenital abnormalities, less than one year age, without previous intervention with cast or surgical were included in the study. Those with previous sessions of casting, previous surgeries, parents unwillingness were excluded. Permission for research was taken from hospital ethics review committee. All the patients with club foot who reported to OPD were scrutinized and syndromic children with club feet were selected. All such children were evaluated in special Ponseti clinic in.

Photographs were taken before starting the first cast. Pirani score was performed on each foot separately to document the extent of deformity before start of Ponseti casting. History, examination and photographs were put into a file for each individual child with individual number. Ponseti casting was started on weekly basis in out patient department Ponseti clinic. Pirani scoring was done and photographs taken every week before next cast and recorded in file. TA tenotomy was done in residual equinus in children who required it before last casting when other deformities got significant correction. Last cast was left for two weeks. After removal of final cast, Pirani scoring was done. Number of casts for each individual, TA tenotomies done in each case and percentage of final correction were recorded in file using Pirani Scoring. All children were put on Dennis Brown shoes following Ponseti casting and TA tenotomy procedure completed. Follow ups were done at 3 months and 6 months following Ponseti casting, to see recurrence rate and addition surgical procedure done or required for more correction.

Data entry and analysis were done at SPSS version 20 at 95% confidence interval and $p < .05$ as significance level. Paired t test was used to compared pre and post Ponseti Pirani scores.

RESULTS

50 children with syndromic/non-idiopathic clubfoot were included in the study. 35 were males and 15 females. 40 had bilateral feet involvement and 10 had unilateral foot involvement. Before the start of Ponseti casting, Pirani scoring done was 5.5 in 3 patients, 8 had 5 score, 11 had 4.5 score, 10 had 4

score, 8 had 3.5 score, 7 had 3 and only 3 had Pirani score of 2.5. Twenty required 13 Ponseti casts, 13 required 12 casts, 8 required 11 casts, 5 required 10 casts, 2 required 9 and 2 required 8 casts before undergoing TA tenotomy. At the end of the all Ponseti casting, there was significant improvement in Pirani scoring but at the cost of more casts than idiopathic clubfoot. Five children had score of 3, 10 had score of 2.5, 20 had score of 2, 9 had score of 1.5 and 6 had Pirani score of 1.

A paired t test was utilized to compare the pre and post ponseti Pirani score. Pre Ponseti mean score was 4.05 (S.D: ± 0.82) while post ponseti mean Pirani score was 2.0 (S.D: ± 0.5). A significant reduction in mean score was found ($t(49) = 39.4$, $p = < .001$).

Thirty children required bilateral TA tenotomy, 16 required unilateral tenotomy, 10 right and 6 left side, and 4 didn't require TA tenotomy. After TA tenotomy, Pirani score further improved. Mean post TA tenotomy score was 1.6 (S.D: ± 0.5). Nine had score of 2.5, 15 had score of 2, 14 had score of 1.5, 8 had score of 1, and 4 reached to improved score of 0.5. On subsequent follow ups, 20 children developed recurrence and 10 required addition surgical procedures to achieve significant correction.

Table 1: Descriptive analysis of study population

Total (N)	50
Gender	
Male	35
Female	15
Foot involvement	
Unilateral	10
Bilateral	40
Surgical Procedures	
Bilateral tenotomy	30
Unilateral Tenotomy	16
Not required	4
Post TA tenotomy mean Pirani score	1.6 (0.59)
Follow up	
Recurrence	20
Additional surgeries	10

Table 2: Outcome of Ponseti Casting

Outcome	Mean (S.D)
Pre Ponseti mean Pirani score	4.05 (0.82)
Post Ponseti mean Pirani score	2.0 (0.5)

DISCUSSION

Clubfoot in syndromic babies or non idiopathic club foot is less commonly seen compared to idiopathic clubfoot. Architecture of such feet is different from

idiopathically deformed feet. But because these types of feet have other problems associated with it, they are normally more resistant to casting. They don't behave or respond to ponseti casting techniques as idiopathic clubfeet do because of the reason that their bony and soft tissue anatomy is different. Development of such babies is not normal. Due to involvement of other joints along with feet, their treatment becomes difficult while considering treating other joints also in casts or surgically. Their treatment is prolonged, compliance is not good, more recurrence rate, post conservative treatment surgery rate is more and unsatisfactory outcome overall. More complexity in treatment of syndromic clubfoot as led to many research work regarding its treatment with Ponseti casting. Ponseti casting has improved its treatment as in idiopathic clubfoot, but results are generally less promising in syndromic clubfoot, due to complexity in nature of the condition, associated abnormalities and multiple joint involvement in lower limbs. Different studies locally and abroad have mentioned outcome of Ponseti casting in syndromic or non idiopathic clubfoot, and most of them agree less favourable outcome compared to idiopathic clubfoot Ponseti casting. Meseguer EF and colleagues¹⁰ showed improved results in syndromic clubfoot but required more casts than idiopathic clubfoot, similar to our study. Abraham J and fellow researchers¹² found out that Ponseti casting corrects deformity in syndromic clubfoot to an extent that future treatment becomes easy. Our study also shows correction to a greater extent. Xia B and colleagues³ showed that Ponseti casting was effective in treatment of non idiopathic clubfoot. Shah A and fellow researchers¹¹ showed improved results in syndromic clubfoot of about 87.7%, hence to be quite effective, similar to ours. Jackson T and colleagues⁴ showed that syndromic clubfoot requires more casting to reasonably correct it as shown by us also. McClure PK and colleagues¹³ showed increased surgical rate due to increased failure of casting and revision in non idiopathic clubfoot. Capriaux AM and fellow researchers¹⁴ found Ponseti casting to be effective in non idiopathic clubfoot. Sharma PK and colleagues¹⁵ showed significant but incomplete improvement in non-idiopathic clubfeet with Ponseti casting comparable to our study. Richards BS and colleague¹⁶ found Ponseti casting to be favourable in non-idiopathic clubfeet but required more surgical intervention at later stages. Funk JF and colleagues¹⁷ showed good results for non-idiopathic clubfoot and recommended Ponseti casting for it as done for idiopathic clubfoot. Esparza M and fellow

researcher¹⁸ showed high rates of recurrence, need for surgery and bad outcome in syndromic clubfoot compared to idiopathic clubfoot with Ponseti casting. Matar HE and colleagues¹⁹ showed Ponseti casting to be effective but have high relapse and needed more number of casts in non-idiopathic clubfoot. Gurnett CA and colleagues²⁰ showed non- idiopathic clubfoot can be treated successfully with Ponseti casting with low recurrence rate and surgery. Guerra-Jasso JJ and colleagues²¹ showed that Ponseti casting is first line and inexpensive treatment in syndromic clubfoot, giving excellent results and preventing further procedures. Zionts LE and colleague²² showed that Ponseti method was successful in syndromic clubfoot. Agarwal A and fellow researchers²³ showed favourable results in syndromic clubfoot with Ponseti casting. Janicki JA and colleagues²⁴ in their research revealed that Ponseti method is successful in non-idiopathic clubfoot but less compared to idiopathic clubfoot.

Ponseti casting gives good results in syndromic clubfoot, as proven by several studies, and our studies gave near same results also.

CONCLUSION

Ponseti casting in syndromic clubfoot is very useful in correcting the deformity. Though it requires more casts and is difficult, but it corrects deformities in non idiopathic clubfoot to a significant extent. Thus Ponseti casting can be employed successfully and confidently in treatment of syndromic clubfoot.

Conflict of Interest: None

Grants/Funding: None

REFERENCES

1. Vukasinovic ZS, Slavkovic NS, Zivkovic ZM, Bascarevic VB. Congenital Club foot. *Acta Chir Lugosl.* 2010; 57(1): 73-6
2. Waschak K, Radler C, Grill F. Congenital club foot. *Z Orthop Unfall.* Mar-Apr 2009; 147(2): 241-62
3. Xia B, Dong YM, Zhang Y, Liu FY, Yuan JY, Yang B et al. Analysis of the efficacy of Ponseti method for treatment of secondary clubfoot in young children with tethered cord syndrome. *Zhonghua Wai Ke Za Zhe.* 2020 Dec; 58(12): 942-946
4. Jackson T, Jones A, Miller N, Georgopoulos G. Clubfoot and tethered cord syndrome: Results of treatment with Ponseti method. *J Pediatr Orthop.* 2019 July; 39(6): 318-321
5. Balasankar G, Luximon A, Al-Jumaily A. Current conservative management and classification of club foot: A review. *J Pediatr Rehabil Med.* 2016 Nov. 30; 9(4): 257-264
6. Radler C. The Ponseti method for the treatment of congenital club foot: review of current literature and current recommendations. *Int Orthop.* 2013 Sep; 37(9): 1747-53

7. Chu A, Lehman WB. Treatment of idiopathic clubfoot in the Ponseti era and beyond. *Foot Ankle Clin.* 2015 Dec; 20(4): 555-62
8. Radler C, Mindler GT, Riedl K, Lipkowski C, Kranzl A. Mid term results of Ponseti Method in treatment of congenital clubfoot. *Int Orthop.* 2013 Sep; 37(9): 1827-31
9. Agarwal A, Gupta S, Sud A, Agarwal S. Results of modified Ponseti Technique in difficult clubfoot and a review of literature. *J Clin Orthop Trauma.* 2020 Mar-Apr; 11(2): 222-231
10. Meseguer EF, Sanchez SR, Almero LP, Bataller AR, Rey MFM. Syndromic clubfoot beyond arthrogryposis myelomeningocele: orthopedic treatment with Ponseti method. *Rev Esp Cir Ortop Taumatol.* May-June 2021; 65(3): 180-185
11. Shah A, Aroojis A, Mehta R. The Ponseti method of treatment for neuro muscular and syndromic (non-idiopathic) clubfeet: evaluation of program-based approach at a mean follow-up of 5.8 years. *Int Orthop.* 2021 Jan; 45(1): 155-63
12. Abraham J, Wall Jr JC, Diab M, Beaver C. Ponseti Casting vs. Soft tissue release for the initial treatment of non-idiopathic clubfoot. *Front Surg.* May 2021; 8: 66-83
13. McClure PK, Kilinc E, Oishi S, Riccio AI, Karol LA. Mobius Syndrome: A 35 years single institution experience. *J Pediatr Orthop.* Oct-Nov 2017; 37(7): e446-449
14. Carpiaux AM, Hosseinzadeh P, Muchow RD, Iwinski HJ, Walker JL, Milbrandt TA. The effectiveness of the Ponseti method for treating clubfoot associated with amniotic band syndrome. *J Pediatr Orthop.* Apr-May 2016; 36(3): 284-8
15. Sharma PK, Verma V, Meena S, Singh R, Km P. Comparative evaluation and analysis of outcomes in non-idiopathic and idiopathic clubfeet with Ponseti method at a tertiary care centre of a developing country. *Foot (Edinb).* Dec 2021; 49: 101841
16. Richards BS, Faulks S. Clubfoot infants initially thought to be idiopathic, but later found not to be. How do they do with non operative treatment? *J Pediatr Orthop.* 2019 Jan; 39(1): 42-45
17. Funk JF, Lebek S, Seidl T, Placzek R. Comparison of treatment results of idiopathic and non-idiopathic congenital clubfoot: prospective evaluation of Ponseti therapy. *Orthopade.* 2012 Dec; 41(12): 977-83
18. Esparza M, Tran E, Richards BS, Jo CH, Shivers C, Karacz C et al. The Ponseti method for the treatment of clubfeet associated with amniotic band syndrome: A single institution 20 years experience. *J Pediatr Orthop.* 2021 May-Jun; 41(5): 301-305
19. Matar HE, Makki D, Garg NK. Treatment of syndrome associated congenital talipes equinovarus using the Ponseti method: 4-12 years of follow up. *J Pediatr Orthop B.* 2018 Jan; 27(1): 56-60
20. Gurnett CA, Boehm S, Connolly A, Reimschisel T, Dobbs MB. Impact of congenital equinovarus etiology on treatment outcomes. *Dev Med Child Neurol.* 2008 Jul; 50(7): 498-502
21. Guerra-Jasso JJ, Valcarce-Leon JA, Del Prado HMQN. Evidence level and grade of recommendation of the Ponseti method for Arthrogryposis related syndromic talipes equinovarus and Moebius syndrome: a systemic review. *Acta Orthop Mex.* Jul-Aug 2017; 31(4): 182-188
22. Zionts LE, Habell B. The use of Ponseti method to treat clubfeet associated with congenital annular band syndrome. *J Pediatr Orthop.* Jul-Aug 2013; 33(5): 563-8
23. Agarwal A, Shaharyar A, Kumar A. Clubfoot associated with congenital constriction band: the Ponseti method perspective. *Foot Ankle Spec.* 2015 Jun; 8(3): 230-3
24. Janicki JA, Narayanan UG, Harvey B, Roy A, Ramseier LE, Wright JG. Treatment of neuromuscular and syndrome-associated (non-idiopathic) clubfeet with Ponseti method. *J Pediatr Orthop.* 2009 Jun; 29(4): 393-7