

## Evaluation of Single Stage Posteromedial Soft Tissue Release for the Treatment of Idiopathic Severe Club Foot

ABDUL HANNAN<sup>1</sup>, MUHAMMAD IQBAL MIRZA<sup>2</sup>, MUHAMMAD KHALID SYED<sup>3</sup>, SYED FARAZ UL HASSAN SHAH GILLANI<sup>4</sup>, MUHAMMAD TAJAMMAL BUTT<sup>5</sup>, USMAN ZAFFAR DAR<sup>6</sup>

<sup>1</sup>Assistant Professor, Orthopedic Surgery, Amana Inayat Medical College, Kishwar Fazal, Hospital, Contact

<sup>2</sup>Associate Professor, Orthopedic Surgery, King Edward Medical University, Mayo Hospital, Lahore.

<sup>3</sup>Assistant Professor, Orthopedic Surgery, KEMU/ Mayo Hospital, Lahore

<sup>4</sup>Senior Registrar, Orthopedic Surgery, King Edward Medical University, Mayo Hospital, Lahore.

<sup>5</sup>Assistant Professor, Orthopedic Surgery, Amana Inayat Medical College, Kishwar Fazal, Hospital

<sup>6</sup>Assistant Professor, Orthopedic Surgery, Gujranwala Medical College, Civil Hospital Gujranwala

Correspondence to Dr. Abdul Hannan, E-mail; drhannanhanif@gmail.com, Cell. 03008644441

### ABSTRACT

**Background:** Club Foot is a multifaceted deformity of foot. Most Orthopedic surgeon agree that the initial treatment of a clubfoot deformity should be non-operative and should begin in the first week of life. In our setup the presentation of congenital club feet is mostly delayed. Reasons behind this late presentation are the large numbers of domiciliary child births attended by traditional birth attendants for whom an early referral to a qualified Orthopedic surgeon is not always possible.

**Aim:** The outcome of single stage posteromedial soft tissue releases for management of severe clubfoot.

**Methods:** This case series was done at Department of Orthopedic Surgery and Traumatology unit –I (DOST-I), King Edward Medical University / Mayo Hospital Lahore. In one-year duration, we included 85 cases of severe club foot child <01year of age of both gender using non-probability, convenient sampling. The patients were admitted in the ward before surgery and pre-operative Pirani scoring was done. All the patients underwent one stage posteromedial release by a single surgical team under tourniquet control under general anesthesia. All patients were followed-up till 6 months and were assessed by using Pirani scoring criteria to assess the effectiveness of the treatment.

**Results:** Out of total 85 cases, the mean age of patients was  $7.49 \pm 2.87$  month with minimum and maximum age of 1 and 11.50 months. In this study there were 58(68.2%) male and 27(31.8%) were females with male to female ratio 2.14:1. Mean Pirani score before treatment was  $8.25 \pm 0.61$  while after treatment mean Pirani score was  $0.98 \pm 0.9$  with minimum score 0 and maximum 3 score. After applying paired sample t-test we found significant reduction in Pirani score after treatment, p-value < 0.001.

**Conclusion:** Through this study we found that single stage posteromedial soft tissue release for management of severe clubfoot is an effective method of clubfoot correction.

**Keywords:** Clubfoot, Ponseti method, Surgical release

### INTRODUCTION

Congenital talipes equinovarus (CTEV) or Club Foot may be described as a foot, multifaceted deformity. The deformity can be present in one or both feet at birth. As excessive planter flexion, with forefoot abduction and inversion (Sole facing inward)<sup>1</sup>. The deformity may develop during fetal life. It is the most commonly occurring foot deformity at birth. This condition is not painful in new born, and if not corrected, it can be painful in walking age<sup>2</sup>. CTEV can present in two forms: the more common "idiopathic" form; not associated with other malformations<sup>3</sup>, or "syndromic", in which other malformations exist.

The incidence of CTEV varies considerably in different races, and it commonly present in black race, (3.5/1,000 in South Africa), Polynesians (6.8/1,000) and Australian Aborigines (3.5/1,000). It is a rare condition in Chinese's and Japanese estimated approximately 0.5 per 1,000 births<sup>4</sup>. In 30-50% of cases, bilateral involvement is found and male to female ratio is 2:1. There are 10% chances of CTEV in second child of parents, who already have first child with club foot deformity<sup>5</sup>.

To have the best chance for a successful outcome without surgical intervention, treatment for clubfoot should begin almost immediately after birth<sup>5</sup>. The best treatment of club foot remain debate over recent years. Although advance in research has improved the Ponseti technique and it must now be appreciated and incorporated by clinicians<sup>8</sup>. However, relapse rate varies from 10% to 30% depending on the amount of follow-up<sup>9-11</sup>. The residual deformity can be present even after serial casting<sup>12</sup> although, data reported 86%-98% successful treatment with Ponseti casting<sup>6,11</sup>.

Surgical management of CTEV includes 'a la carte' approach in which structures are released till correction of deformity is attained, and the 'one-size fits all' procedure in which regardless of the severity of foot, every foot undergoes single operation. Data reported good results of one stage posteromedial release<sup>14</sup>. In Pirani scoring, the club foot is classified into three four types included normal, mild, moderate and severe type. It has good predictive values and can also be used postoperatively for outcome assessment<sup>13</sup>.

The non-operative treatment has its own merits and de-merits. The reported un-satisfactory results of conservative method are the main reason for opting various soft tissue procedures, and amongst them, Turco's

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posterior-medial soft tissue release is one stage operation which was modified with release of planter fascia with no use of k-wires<sup>14</sup> The poor compliance of patients from remote areas and one major reason is that they are not able to pay regular visit for serial casting. For such patients, the alternate treatment method also includes less follow up visits and correction of the condition, the treatment outcome can be improved. The aim of this study was to determine the surgical outcome in patients with severe clubfoot managed with single staged posteromedial soft tissue release.

## METHODOLOGY

This prospective case series was done using non-probability convenient technique at the Department of Orthopedic Surgery and Traumatology unit-I (DOST-I), King Edward Medical University, Mayo Hospital Lahore between March 2012 to February 2015. The sample size of the study was 85 cases of severe club foot with age less than 01-year of either. The exclusion criteria of the study were all patients already treated with surgical procedure, having neglected club foot and other congenital deformities.

After approval from institutional review board of the University, we sought signed informed written consent from the parents of the child. They were explained about the study purpose and all patients who signed the consent were included. We obtained demographic details included name, age, gender and type of clubfoot on pre-designed questionnaire. The patients were admitted in the ward and their anesthesia fitness was obtained. We calculated Pirani score of all patients before the surgery. Preoperative antibiotics injection Cephadrine 500mg was given half an hour before the surgery in all patients. Under general anesthesia and tourniquet application, all the patients were operated with one stage posterior-medial release by a single surgical team. We followed patients post-operatively for 06 months in out-patient department (OPD). We calculated Pirani scoring on every follow up visit in the OPD.

We entered and analyzed data using software SPSS version 20.0. We presented all quantitative variables as mean± standard deviation. Qualitative variables like gender were presented as frequency and percentages. A p-value <0.05 was taken as statistically significant.

## RESULTS

Out of total 85 patients, there were 58 (68.2%) male and 27 (31.8%) were female's child with male to female ratio 2.14:1. The mean age of patients was 7.49±2.87 month with minimum and maximum age of 06 and 11.50 months respectively. In this study According to side involved, in 29 (34.1%) right side was involved, 30 (35.3%) had left and 26 (30.6%) patients had both sided feet. Among all patients 55 (64.7%) patients were treated with casting while 30(35.3%) had no prior casting before they were enrolled in this study. Mean Pirani score before treatment was 8.25±0.61 while after treatment mean Pirani score was 0.98±0.9 with minimum score 0 and maximum 3 score. After applying paired sample t-test we found significant reduction in Pirani score after treatment, p-value < 0.001.

Table 1: Frequency distribution of age, gender, side of foot involved and prior treatment with casting (n=85)

Variables	Frequency	%age
<b>Gender</b>		
Male	58	68.24
Female	27	31.76
<b>Mean age±SD (Months)</b>	7.49±2.87	
<b>Affected side</b>		
Right	29	34.1
Left	30	35.3
Both feet	26	30.6
<b>Treated with Casting</b>		
No	55	64.7
	30	35.3
Pirani score before treatment	8.25±0.61	
Pirani score after treatment	0.98±0.90	

Table 2; Descriptive Statistics and comparison of Pirani score before and after treatment

	Pirani Score Before	Pirani Score after
Mean	8.25	0.98
Std. Deviation	0.61	0.90
Range	2.00	3.00
Minimum	7.50	0.00
Maximum	9.50	3.00

P value <0.001

## DISCUSSION

The CTEV is a three-dimensional deformity having four components including midfoot cavus, forefoot adduction, heel varus and equinus (CAVE). Cavus is due to increased longitudinal arch of foot, adduction means the tarsal bones are deviated to the median plane, varus is the deformity of calcaneum that is inverted and adducted and equinus stands for excessive plantar flexion of the foot.<sup>15</sup> In developing countries the prevalence of congenital talipes equinovarus (clubfoot) is estimated to be approximately one in 1000 births<sup>1</sup>.

The treatments used traditionally for clubfoot may comprise of initial immobilization with serial casting. The delayed presenting cases and all cases with persistent deformity after serial casting required postero-medial soft tissue releases along with bony procedures and followed by further casts. This treatment method poses significant risks and complication. It is associated with poor prognosis with patients developing weak, scarred and stiff feet. Follow-up studies have also described that gait of those having these feet is affected and a higher incidence of pain is reported in them<sup>18</sup>.

During second half of twenty century, the idiopathic club foot was primarily treated from gentle manipulation with casting to the aggressive surgical treatment. There was predominance of surgical correction as it was considered that a full and lasting correction can be obtained by this method. Over the period of time with increasing experiences, the surgeons realized that it was based on follow up studies that the results of surgical intervention are not predictable<sup>17,18</sup>.

Scarring leading to stiffness, pain and recurrent deformity can be the result of extensive soft-tissue releases. Can<sup>19</sup> Promising results of ponseti method and the observation of side effects of surgical releases shifted the treatment of idiopathic clubfoot from surgery to more

conservative approach. The conservative approach comprises of serial manipulations along with castings and frequently there is need of minimal invasive surgery. Cases failed to these serial castings are usually reserved for open surgery. but the procedures used now a day for such surgical releases are far less aggressive than those used two three decades ago<sup>20</sup>.

We in this study aimed to do single stage posteromedial soft tissue release for management of severe clubfoot. The disease is more common in male patients with male-to-female ratio is 2:1<sup>36</sup>. In this study we also found that the male to female ratio was 2.08:1. The disease can present in both feet in 30-50% of cases. There are reported 10% chance of club foot in second child in parents with club foot deformity in first child and it is alarming<sup>21</sup>.

A local study was done on 70 patients with the age range of 6 months to 3 years with moderate to severe deformity. In this study, there were 54.2% and 45.72% were female, when we compared with our study we have 68.2% male and 31.8% female, our study has higher population of male patients with male to female ratio 2.14:1. When we compared the side of foot 32.85% had bilateral club foot and 67.15% had unilateral deformity compared to our study has similar 30.6% patients with bilateral foot involvement and 34.1% had right side foot involvement, 35.3% had left foot involved at the time of presentation. Our statistics are in agreement with above studies.

The modifications Turco or posteromedial release (PMR) include: unaffected foot on top with lateral position of the patients; the incision is Cincinnati-type, with abductor hallucis muscle complete excision, and approach to complete the tenotomy of tibialis posterior tendon in the sheath, no lengthening of long toe flexors. There is no need of K wires for maintenance of correction and special splints instead of Denis Browne splints. The data reported minimal complications with this technique. Data reported mean Laaveg and Ponseti score with this technique showed 87.2 (range, 49-98) score. Majority 82% amongst total 33 feet treated had good to excellent results. Recurrent deformities with this technique was low included 6% of all deformities and only 6% patients with adduction of forefoot, also favored the use of this technique. When patient's satisfaction was asked, majority 94% of patients answered that they were either very satisfied or satisfied with the results. In our study, this approached has little wound complications as compared with other technique and reduce the recurrence of forefoot adduction deformity (Singh and Vaishnavi, 2005) One local study reported that Excellent results were observed in 65.4% patients, good in 17.3% patients, fair in 3.8% patients, and poor in 13.5%<sup>22</sup>.

The draw backs of our study include, single surgical approach and small sample size decreases the evidence level of the study. The good aspect of the study include the treatment of patients with poor compliance with serial casting in correction of deformity and minimum follow up. In this study mean Pirani score before treatment was 8.25±0.61 while after treatment mean Pirani score was 0.98 ± 0.9 with minimum score 0 and maximum 3 score. After

applying paired sample t-test we found significant reduction in Pirani score after treatment, p-value < 0.001.

## CONCLUSION

Through this study we found that single stage posteromedial soft tissue release for management of severe clubfoot is an effective method of severe idiopathic clubfoot correction with less wound complication and good satisfaction of the patients. We recommend studies with large population to extend the significance of our study.

## REFERENCES

1. Nguyen MC, Nhi HM, Nam VQD, Van Thanh D, Romitti P, Morcuende JA. Descriptive Epidemiology of Clubfoot in Vietnam: A Clinic-Based Study. *The Iowa orthopaedic journal*. 2012;32:120.
2. Dobbs MB, Gurnett CA. Update on clubfoot: etiology and treatment. *Clinical orthopaedics and related research*. 2009;467(5):146-53.
3. Pavone V, Bianca S, Grosso G, Pavone P, Mistretta A, Longo MR, et al. Congenital talipes equinovarus: an epidemiological study in Sicily. *Acta orthopaedica*. 2012;83(3):294-8.
4. Kruse LM, Dobbs MB, Gurnett CA. Polygenic threshold model with sex dimorphism in clubfoot inheritance: the Carter effect. *The Journal of bone & joint surgery*. 2008;90(12):2688-94.
5. Parker SE, Mai CT, Canfield MA, Rickard R, Wang Y, Meyer RE, et al. Updated national birth prevalence estimates for selected birth defects in the United States, 2004–2006. *Birth Defects Research Part A: Clinical and Molecular Teratology*. 2010;88(12):1008-16.
6. Sarrafan N, Mehdi Nasab SA, Fakoor M, Zakeri A. Short term outcome of congenital clubfoot treated by Ponseti method. *Pakistan Journal of Medical Sciences*. 2012;28(3).
7. Boden R, Nuttall G, Paton R. A 14 year longitudinal comparison study of two treatment methods in clubfoot: Ponseti vs traditional. *Journal of Bone & Joint Surgery, British Volume*. 2012;94(SUPP XXXIX):150-.
8. Evans AM. A review of the Ponseti method and development of an infant clubfoot program in Vietnam. *Journal of the American Podiatric Medical Association*. 2009;99(4):306-16.
9. Owen RM, Kembhavi G. A critical review of interventions for clubfoot in low and middle-income countries: effectiveness and contextual influences. *Journal of Pediatric Orthopaedics B*. 2012;21(1):59-67.
10. Chu A, Lehman WB. Persistent clubfoot deformity following treatment by the Ponseti method. *Journal of Pediatric Orthopaedics B*. 2012;21(1):40-6.
11. Bhaskar A, Patni P. Classification of relapse pattern in clubfoot treated with Ponseti technique. *Indian journal of orthopaedics*. 2013;47(4):370.
12. Sami AL, Hanif A, Awais SM. Causes of Failure of Conservative Treatment of Club Foot. *Annals of King Edward Medical University*. 2010;16(1).
13. Dyer PJ, Davis N. The role of the Pirani scoring system in the management of club foot by the Ponseti method. *The Journal of bone and joint surgery British volume*. 2006;88(8):1082-4. Epub 2006/08/01.
14. Valentin B. *Geschichte der Orthopaedie*. Thieme, Stuttgart. 1961:6.
15. Jowett C, Morcuende J, Ramachandran M. Management of congenital talipes equinovarus using the Ponseti method A SYSTEMATIC REVIEW. *Journal of Bone & Joint Surgery, British Volume*. 2011;93(9):1160-4.
16. Jain K. Need of a formal psychotherapist-delivered counseling as a part of management of bony deformities, with emphasis on clubfoot. *Indian journal of psychiatry*. 2010;52(4):388.
17. Ippolito E, Farsetti P, Caterini R, Tudisco C. Long-term comparative results in patients with congenital clubfoot treated with two different protocols. *J Bone Joint Surg Am*. 2003;85(7):1286-94.
18. 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.
19. Carroll NC. Clubfoot in the twentieth century: where we were and where we may be going in the twenty-first century. *J Pediatr Orthop B*. 2012;21(1):1.
20. Lykissas MG, Crawford AH, Eismann EA, Tamai J. Ponseti method compared with soft-tissue release for the management of clubfoot: A meta-analysis study. *World J Orthop*. 2013;4(3):144-53.
21. Parker SE, Mai CT, Strickland MJ, Olney RS, Rickard R, Marengo L, et al. Multistate study of the epidemiology of clubfoot. *Birth Defects Research Part A: Clinical and Molecular Teratology*. 2009;85(11):897-904.
22. Hussain S, Khan M, Ali M. Modified Turco's postero-medial release for congenital talipes equino-varus. *J Ayub Med Coll Abbottabad*. 2007;20(3):78-80.