

An analysis of the results of a modified one-stage turco's posteromedial release for the treatment of clubfoot

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Abstract

Objective: To analyze of the results of a modified one-stage Turco's posteromedial release for the treatment of clubfoot in patients of less than three years of age.

Material and methods: This prospective study in 40 patients of less than 3 years of age was treated with Turco's posteromedial release, then followed up for 3 years after their operation was done from January 2004 To December 2010 in Orthopedic Department of Hayatabad Medical Complex Peshawar.

Results: Out of fifty patients 31 (62%) were male and 19 (38%) were female. Minimum age was 6 months maximum 36 and mean age was 17.16 (Std Dev 7.87). Function results at first follow up were excellent in 26 (52.0%), good in 18 (36.0%) and fair in 6 (12.0%) patients. Functional Results at three years (last) follow up were excellent in 23 (46.0%), good in 21 (42.0%), fair in 4 (8.0%), Poor in 1 (2.0%) and Failure in 1 (2.0%) patients. Postoperatively 10 of our patients (i.e. 20%) developed swelling of the toes and in these patients the casts were open widely and later on augmented by applying crepe bandages.

Four of the patients (8%) got wound inflammation on the first postoperative visit and was subsided by the next visit. None of our patients got wound infection.

Conclusion: All the clubfeet resistant to conservative treatment do not need extensive releases but could be corrected with less extensive procedures as posteromedial release of Turco because it is an effective procedure with about 80% excellent to good results in clubfeet resistant to conservative treatment.

Keywords: Clubfoot, Talipes equinovarus, Posteromedial release

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Introduction:

Congenital talipes equinovarus (CTEV), often known as 'club-foot', is a common developmental disorder of the lower limb.¹ It is defined as fixation of the foot in adduction, in supination and in varus, i.e. inclined inwards, axially rotated outwards and pointing downwards.¹ The calcaneus, navicular and cuboid bones are medially rotated in relation to talus, and are held in adduction and inversion by ligaments and tendons². Although the foot is supinated, the front of the foot is pronated in relation to back of the foot, causing cavus. In addition, the first metatarsal is more plantar flexed. Congenital talipes equinovarus is termed 'syndromic' when it occurs in association with other features as part of a genetic

syndrome, or it can occur in isolation in which case it may be termed 'idiopathic'.^{2,3} Syndromic talipes equinovarus arises in many neurological and neuromuscular disorders, for example spina bifida or spinal muscular atrophy, but the idiopathic form is by far the most common (about 95%).¹ It may be unilateral or bilateral. It is a hereditary foot deformity of unproven etiology, which affects both sexes (males more frequently than females).³

The treatment of clubfoot can be divided into conservative and surgical. The conservative methods include manipulation and serial casting by Kite⁴, French⁵ and Ponseti⁶ technique, which were followed by operative treatment if

the conservative treatment failed.

The conservative treatment was proposed by Hippocrates in 400 BC when he recommended gentle manipulation followed by splinting.⁷ Plaster casts were used to treat clubfoot when Guerin⁸ introduced the plaster of Paris in 1836. Kite⁴ was the first to recommend gentle manipulation and cast immobilization.

Dissatisfaction with the results of non operative treatment and various soft tissue procedures provided the incentive to develop one stage operation which should provide lasting correction that was correctly described by Turco^{8,9}, the postero-medial release (PMR). The rationale behind Turco's PMR was that the deformity is due to the congenital subluxation of the talocalcaneonavicular joint, the correction of the abnormal tarsal relationship is prevented by rigid pathologic soft tissue contractures and the correction of any single component of the deformity is impossible while simultaneously eliminating the others. There two prerequisites for lasting correction which are; 1) complete correction of all components must be obtained and, 2) this correction must be maintained while the tarsal bones remodel.^{9,10}

The objective of the study is to analyze of the results of a modified one-stage Turco's postero-medial release for the treatment of clubfoot in patients of less than three years of age that present in Orthopedic unit of Hayatabad Medical Complex Peshawar..

Material and methods:

This prospective hospital based observational study in patient of less than 3 years of age was done from January 2004 To December 2010 in Orthopedic Department of Hayatabad Medical Complex Peshawar.

Inclusion criteria:

- Age less than 3 years
- Either sex
- The feet which did not correct by conservative measures were included
- Only idiopathic clubfeet

Exclusion criteria:

- Talipes equino-varus secondary to some other disorder (as poliomyelitis, or cerebral palsy), and talipes equino-varus associated with other congenital anomalies such as arthrogryposis multiplex congenita, myelodysplasia or developmental dysplasias of hip were excluded.
- Patients of more than three years were excluded.
- Patients previously operated were also excluded.

This study includes fifty patients who were admitted in the ward, operated and then followed up for 3 years after their operation.

On admission, a detailed history, including pre-natal history, birth history and family history of congenital anomalies was taken. All patients had a detailed orthopedics examination of hips, spine and extremities, analysis of gait was done, severity of the deformity (i.e. mild, moderate and severe) and calf circumferences were recorded. The length and width of feet were measured.

The need for surgical correction was discussed thoroughly with the parents of the patients, and they were also told about the postoperative complications, and chances of recurrence of the deformity. Informed consent was taken from the father or close relatives of the patients.

Operative Technique

The skin was incised from the base of the first metatarsal to the lateral side of tendo Achillis which was lengthened, as were the tendons of tibialis posterior, flexor hallucis longus and flexor digitorum longus using a Z technique. The posterior talofibular and calcaneofibular ligaments, the posterior third of the deep deltoid ligament, the superficial deltoid and the talocalcaneal interosseous ligaments, the spring ligament and the Y ligament were all divided. The anterior end of the calcaneus was moved laterally, the navicular anteriorly, and the head of the talus medially. In this corrected position, a Kirschner wire was inserted through the talus to the first metatarsal transfixing the talonavicular

lar joint. An above-knee plaster cast was applied with the knee flexed and foot in fully corrected position (cast was fully split after application). The cast was changed after two weeks, stitches removed and another cast was applied for six weeks. After six weeks the Kirschner wires was removed. Then the patients were followed up monthly for next three months, and then on every third month for one year. For the next two years the patients were followed up six monthly. The foot was protected with a Denis- Browne splint at night for one year and a shoe insert was used for three years.

At each visit, the feet were thoroughly examined for complications. The success of the correction and results were drawn according to the modified Mc Kay rating system¹¹. (Table 1)

Results:

There were total fifty patients with 59 feet. We lost 9 feet during follow up and only fifty were followed up for three years. Out of fifty patients 31(62%) were male and 19(38%) were female (Figure 1). Left foot was involved in 20(40%) patient, right in (21%) and bilateral involvement was ((18%) (Table 2). Minimum age was 6 months maximum 36 and mean age was 17.16 (Std Dev 7.87) (Table 3). Functional results at first follow up were excellent in 26(52.0%), good in 18(36.0%) and fair in 6(12.0%) patients. Functional results at two years follow up were excellent in 24 (48.0 %), good in 21(42.0%), fair in 4(8.0%) and Poor in 1(2.0%) patients. Functional Results at three years (last) follow up were excellent in 23 (46.0 %), good in 21(42.0%), fair in 4(8.0%), Poor in 1(2.0%) and Failure in 1(2.0%) patients (Table 4).

Postoperatively 10 of our patients (i.e. 20%) developed swelling of the toes and in these patients the casts were open widely and later on augmented by applying crepe bandages.

Four of the patients (8%) got wound inflammation with redness and edema was found around the wound on the first postoperative visit, but no pus collection was noted. In these patients after applying dry dressing, well padded casts

Table 1(a): Mc Kay rating system

Category	Subtract from 180 Points
Ankle Motion	
>90 <90 Total	
>10 <40 50	0
>10 <30 40	-10
>10 <25 35	-20
>10 <25 <35	-30
Bimaleolar to longitudinal plane angle	
83-90 degrees	0
76-82 degrees	-10
50-75 degrees	-20
Strength of triceps surae	
Weight supported on toes, one foot only	0
Weight supported on toes, both feet	-10
Weight not supported on toes	-20
Heel	
0-5 degrees valgus	0
5-10 degrees valgus	-5
More than 10 degrees valgus	-10
Varus	-20
Forefoot	
Neutral	0
5 degrees of adduction or abduction	-5
over 5 degrees	-10
Flexor Hallucis Longus	
Functional	0
Non-Functional	-10
Ankle pain	
Constantly disabling	-30
Tolerable during daily activities	-20
Limping at the end of day	-10
Interferes only with running	-5
Subtalar pain	
Constantly disabling	-30
Tolerable during daily activities	-20
Limping at the end of day	-10
Interferes only with running	-5
Shoe Wear	
Stylish	-5
Foot deforms shoe	-10
Shoe do not fit	-15
Competitive	0
Non-Competitive	-15

were given and antibiotics and anti inflammatory agents were given for another 7 days. In all

Table 1(b): Mc Kay rating system

Points	Rating
175—180	Excellent
160—174	Good
125—159	Fair
90 —124	Poor
< 90	Failure

Table 2: Limb Involvement (n= 50)

Limb Involvement	Number of Patients	Percentage
Left	20	40%
Right	21	42%
Bilateral	9	18%
Total	50	100%

these 4 patients the edema and inflammation was found subsided by the next visit. None of our patients got wound infection.

Discussion:

The proper management of CTEV is debatable in orthopedic literature. While details on various surgical procedures are easy to find, manipulative techniques and there results are rarely described. In a study from Singapore 174 clubfeet were treated conservative with a success rate of 100 (58%), the remaining 74 (42%) clubfeet were operated which show that almost half of patients need still need surgery for CTEV¹². This is the reason that still surgery is preferred in our part of the world. Compliance is a problem in conservative method due to poor socioeconomic condition of parents.

The compliance of the patients was good in our patients, we lost 9 patients out of 50 patients, thus the follow up rate was 82% at the end of last follow up, while Hutchins et al¹³ presented a follow up rate of 70% after a mean follow up of 15 years and 10 months. Harrold et al¹⁴ has about 95% of follow up rate in his patients treated for clubfoot deformity. By the end of three years we reviewed 50 feet, as the remaining 9 were lost for follow up.

The degree of correction was measured according to the Mc Kay rating system¹¹ in our patients. Functional Results at three years (last

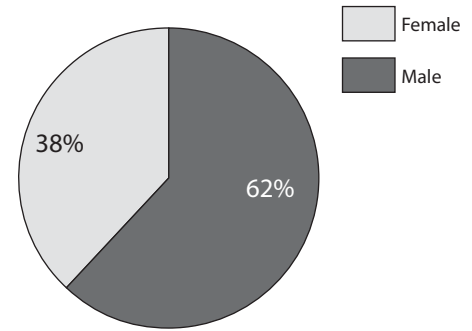


Figure 1: Sex Distribution (n= 50)

follow up were excellent in 23 (46.0 %), good in 21 (42.0%), fair in 4(8.0%), poor in 1(2.0%) and failure in 1(2.0%) patients. Turco VJ¹⁵ reported 83% satisfactory results, 12% fair results and 5% failure with his surgical procedure.¹⁵ Thompson et al¹⁶ achieved excellent results in 86% of cases corrected with Turco's posteromedial release. Hoque MF¹⁷ has got excellent-good results in 75% rigid clubfeet, and has 11% fair and 13% poor results with Turco's Posteromedial release.

With Turco's posteromedial release, in patients of 9 months to 4 years of age, Otremski I¹⁸ achieved full correction, of equinus in 98%, heel varus in 91%, cavus in 85% and forefoot adduction in 91% of cases.¹⁸

The main residual deformity was fore foot adduction, it was about 5 degrees in 6 patients and more than 5 degrees in another 6 of our patients while Otremski I¹⁸, achieved full correction, of equinus in 98%, heel varus in 91%, cavus in 85% and forefoot adduction in 91% of cases. Heel varus was present in 6 patients, while it was neutral in remaining 24 patients.

The results of our study are comparable to other studies done by Munshi S et al¹⁹, Edmondson MC et al²⁰, Macnicol MF et al²¹, Schlegel UJ et al²² and Halanski MA²³.

Conclusion:

All the clubfeet resistant to conservative treatment do not need extensive releases but could be corrected with less extensive procedures as posteromedial release of Turco because it is an effective procedure with about 80% excellent to

Table 3: Statistics

	Age of patients in months	Functional Results		
		At First follow up	At two years follow up	At three years (last) follow up
N	50	50	50	50
Mean	17.16	1.60	1.64	1.72
Median	15.50	1.00	2.00	2.00
Mode	12 ^a	1	1	1
Std. Deviation	7.87	.70	.72	.86
Range	30	2	3	4
Minimum	6	1	1	1
Maximum	36	3	4	5

^aMultiple modes exist. The smallest value is shown

Table 4: Functional Results

Rating	Frequency	Percentage	Cumulative Percentage
At First follow up			
Excellent	26	52.0	52.0
Good	18	36.0	88.0
Fair	6	12.0	100.0
At two years follow up			
Excellent	24	48.0	48.0
Good	21	42.0	90.0
Fair	4	8.0	98.0
Poor	1	2.0	100.0
At three years (last) follow up			
Excellent	23	46.0	46.0
Good	21	42.0	88.0
Fair	4	8.0	96.0
Poor	1	2.0	98.0
Failure	1	2.0	100.0

good results in clubfeet resistant to conservative treatment.

Proper postoperative immobilization of the feet, in position of correction in plaster casts and thereafter in splints is very important. Similarly good compliance from the patients (i.e. parents) in follow up is very significant.

References:

1. Miedzybrodzka Z. Congenital talipes equinovarus (club-foot): a disorder of the foot but not the hand. *J Anat.* 2003; 202(1):37-42.
2. Zionts LE, Zhao G, Hitchcock K, Maewal J, Ebramzadeh E. Has the rate of extensive surgery to treat idiopathic clubfoot declined in the United States? *J Bone Joint Surg Am.* 2010 Apr;92(4):882-9.

3. McKay DW. New concept of and approach to clubfoot treatment: section I- Principles and morbid anatomy. *J Pediatr Orthop* 1982; 2: 347-56.
4. Shyam AK. Comparison of Ponseti and Kite's method of treatment for idiopathic clubfoot. *Indian J Orthop.* 2011 Mar;45(2):188.
5. Chotel F, Parot R, Seringe R, Berard J, Wicart P. Comparative study: Ponseti method versus French physiotherapy for initial treatment of idiopathic clubfoot deformity. *J Pediatr Orthop.* 2011 Apr-May;31(3):320-5.
6. Ponseti IV, Smoley EN. The classic: congenital club foot: the results of treatment. *Clin Orthop Relat Res.* 2009 May;467(5):1133-45.
7. Xu RJ. A modified Ponseti method for the treatment of idiopathic clubfoot: a preliminary report. *J Pediatr Orthop.* 2011 Apr-May;31(3):317-9. 5: Shyam AK. Comparison of Ponseti and Kite's method of treatment for idiopathic clubfoot. *Indian J Orthop.* 2011 Mar;45(2):188.
8. Dangelmajor RC. A review of 200 clubfeet. *Bull. Hosp. Spec. Surg* 961; 4:73-80.
9. Turco VJ. Surgical correction of the resistant clubfoot. One stage posteromedial release with internal fixation: a preliminary report. *J Bone Joint Surg* 1971; 53-A: 477-97.
10. Zionts LE, Dietz FR. Bracing following correction of idiopathic clubfoot using the Ponseti method. *J Am Acad Orthop Surg.* 2010 Aug;18(8):486-93.
11. McKay DW. New concept of and approach to clubfoot treatment: section I- Principles and morbid anatomy. *J Pediatr Orthop* 1982; 2: 347-56.
12. Nather A. Conservative and Surgical Treatment of Clubfoot. *J Pediatr Orthop* 1987;7:42-8.
13. Hutchins P M, Foster B K, Paterson D C, and Cole E N. Long term of early surgical release in clubfeet. *J Bone Joint Surg* 1985; 67-B (5): 791-99.
14. Harrold A J, and Walker C J. Treatment and prognosis in CC. *J Bone Joint Surg* 1983; 65-B: 8.
15. Turco VJ. Surgical correction of the resistant clubfoot. One stage posteromedial release with internal fixation: a preliminary report. *J Bone Joint Surg* 1971; 53-A: 477-97.
16. Thompson GH, Richardson AB, and Westin GW. Surgical treatment of Congenital Talipes Equinovarus. *J Bone Joint Surg* 1982; 64-A: 652-65.
17. Hoque MF, Uddin N, Sultana S. Operative management of rigid congenital club feet in Bangladesh. *Int Orthop.* 2001; 25(4):260-2.
18. Otremski I, Salama R, Khermosh O, Wientroub S. An analysis of the results of a modified one-stage posteromedial release (Turco operation) for the treatment of clubfoot. *J Pediatr Orthop.* 1987; 7(2):149-51.
19. Munshi S, Varghese RA, Joseph B. Evaluation of outcome of treatment of congenital clubfoot. *J Pediatr Orthop.* 2006; 26(5):664-72.
20. Edmondson MC, Oliver MC, Slack R, Tuson KW. Long-term follow-up of the surgically corrected clubfoot. *J Pediatr Orthop B.* 2007; 16(3):204-8.
21. Macnicol MF, Nadeem RD, Forness M. Functional results of surgical treatment in congenital talipes equinovarus (club-foot): a comparison of outcome measurements. *J Pediatr Orthop B.* 2000; 9(4):285-92.
22. Schlegel UJ, Batal A, Pritsch M, Sobottke R, Roellinghoff M, Eysel P et al. Functional midterm outcome in 131 consecutive cases of surgical clubfoot treatment. *Arch Orthop Trauma Surg.* 2010 Sep;130(9):1077-81.
23. Halanski MA, Davison JE, Huang JC, Walker CG, Walsh SJ, Crawford HA. Ponseti method compared with surgical treatment of clubfoot: a prospective comparison. *J Bone Joint Surg Am.* 2010 Feb;92(2):270-8.