

A 13 YRS STUDY IN SURGICAL MANAGEMENT OF CTEV WITH MODIFICATIONS IN TURCOS SOFT TISSUE RELEASE IN LESS THAN 1 YR AGE GROUP

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ABSTRACT: BACKGROUND: Congenital talipes equinovarus (CTEV) is a common congenital disorder of the lower limb but still not only fully understood. Different treatment options in different age groups exists including Turco's Soft tissue release.^(1,2,3,4) **AIM:** We report here the results obtained in infants less than 1Yr age group with CTEV treated by slight modifications in Turco's PMSTR.^(5,3) **MATERIAL & METHODS:** 148 Infants treated, of which male 90, female 58, bilateral feet in 68 infants left foot in 55, right foot in 25. All are rigid type less than 1Yr age group. 28 Patients have positive family history. 60% patients turned up for follow up. **RESULTS:** After an average follow up of 62 months the results were excellent in 129feet, good in 69 feet, poor results in 6 feet, 12 patients did not turn up follow up. When excellent and good results were combined the result was satisfactory in all feet out of 202 feet. Suture line gaping found in 14 cases and skin necrosis in 8cases. **CONCLUSION:** One stage Soft tissue release is excellent procedure as described by Turco but within small modifications performed at on appointment time.

KEYWORDS: CTEV Turcos, Posteromedial soft tissue release, complete subtalar release, Ponseti method.

INTRODUCTION: The human foot in unique unlike any other foot in the animal kingdom. Though congenital talipes equinovarus (CTEV) the commonest form of clubfoot, exists from time immemorial, its etiology is unkwon, pathology is complex and management is full of controversies.^(6,7,8) From the time of Hippocrates till today, the orthopaedics surgeons are constantly confronted with new techniques and operations in its management.

It requires judicious selection of cases and use of appropriate method of treatment.^(5,3) We have passed through the phase of forcible manipulation of clubfoot to microsurgical operative techniques and correction by external fixator. Inspite of careful research it remains a source of dissatisfaction even to the most enthusiastic surgeon.

This article consists results of a study of Turcos postero medial soft tissue release without k wire fixation in less than one year age group, the study conducted from 2001 to 2014. Results are 62% excellent, 33% good and 5% poor, We observed skin necrosis, adduction and varus deformities in few cases, We concluded that early intervention will get excellent results. It reveals increasing awareness among that the deformity can be fully corrected leading to early consultation and regular follow-up of parents.

PATHOLOGICAL ANATOMY.^(1,6,9,10,11) Still we believe that contracture or fibrosis of ligaments to be responsible for deformities. Ponsetti concluded that retractive fibrosis akin to torticollis; Dupuytren's contracture might be primary etiological factor in clubfoot. Turco (1959) Mckay (1982) and Simons (1985) laid the blame on the subtalar joint while Goldner (1979) laid stress on the abnormal position

of talus in ankle joint. Subluxation or dislocation of talo-navicular joint was stressed by Turco (1979), Simons (1985).

SOFT TISSUE CONTRACTURES : The soft tissue contractures are acquired in accordance with the Law of Davis “when ligaments and soft tissues are in a loose of lax state they gradually get shorter”.^(9,10) Adam et al. believed that fixed contractures of the associated soft tissues whether primary or secondary serve to prevent spontaneous rearrangement of bony malposition.

POSTERIOR CONTRACTURES:

1. Tendo Achilles.
2. Posterior Capsule of ankle and subtalar joint.
3. Contracture of distal tibiofibular syndesmosis.
4. Posterior talofibular ligament and.
5. Calcaneo fibular ligament.

MEDIAL AND PLANTAR CONTRACTURES:

1. Tibialis posterior tendon.
2. Flexor hallucis longus tendon.
3. Flexor digitorum longus tendon.
4. Deltoid ligament.
5. Talonavicular capsule.
6. Spring ligament.
7. Abductor hallucis.
8. Flexor hallucis brevis.
9. Flexor digitorum brevis and
10. Plantar aponeurosis.

The fibrosis of the above structure form a mass of indistinguishable scar, which obscures the midtarsal and subtalar joints, and maintain the tuberosity of the navicular and sustentaculum tali in close proximity to the medial malleolus.

SUB TALAR CONTRACTURES:

1. Talocalcaneal interosseous ligament and 2. Bifurcated “Y” ligament. Fibrosis and shortening of the talocalcaneal ligament increases with age of the child. Contracture of bifurcated “Y” ligament, although less common, can prevent complete correction of the varus, adduction components in some severe deformities.^(9,10,3)

CLINICAL FEATURES AND CLASSIFICATION,^(9,12,13,11)

There are four basic deformities in C.T.E.V.

1. Fore foot adduction.
2. Hind foot inversion, with supination is called varus.
3. Hind foot equinus.
4. Medial subluxation of the navicular on the head of talus and there can be internal tibial torsion and cavus.

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CLASSIFICATION DEPENDING ON RIGIDITY OF THE DEFORMITY:

- a. Non rigid type or postural clubfoot: Packing syndrome. It is primarily a persistence of the intrauterine position. It is fully correctable to normal anatomical position at birth or shortly thereafter following a period of serial corrective casting.
 - b. Rigid type: It is a true clubfoot with all basic elements. The foot is fixed in adduction, inversion and equinus position. The soft tissue derangement disallows immediate passive correction.
 - c. Resistant types: Clubfoot seen in association with other diseases, such as arthrogryposis and meningomyelocele.
1. The clubfoot can also be classified according to the correction that can be achieved passively at the time of first clinical examinations.
 - a. I degree – mild
Adduction, inversion and equinus are correctable passively i.e., all deformities are correctable.
 - b. II degree – Moderate
Adduction and inversion are correctable passively but not equinus i.e., ankle deformity not correctable passively.
 - c. III degree : severe
No deformity is correctable passively.

Classification Grade	Type	Score	Reducibility
I	Benign	<5	>90° Soft –soft resolving
II	Moderate	5 to < 10	>50° soft-stiff, reducible, partly resistant
III	Severe	10 to <15	<50° stiff-soft, resistant, partly reducible
IV	Very sever	15 to <20	<10° stiff – stiff resistant
<i>Dimeglio et al for the classification of congenital talipes equinovarus</i>			

Grade	Severity	Residual Deformity with Correction
1	Mild	Neutral or beyond
2	Moderate	< 20°
3	Severe	>20°
<i>Harrold and Walker classification</i>		

MANAGEMENT.^(12,14,15,16): The aim of treatment is to achieve complete correction of deformity and a pliable plantigrade cosmetically acceptable foot universal agreement exists that the initial treatment of clubfoot should be no surgical.

CONSERVATIVE TREATMENT: The first attack on an untreated clubfoot in new born child should be nonsurgical. It consists of serial gentle stretching or manipulation of the affected foot and to maintain the correction by apply casing.⁽¹⁶⁾

Conservative management is effective in two ways:

1. By completely correcting the clubfoot as the definitive treatment. About 50% of clubfoot can be treated successfully by serial manipulation and casting.
2. By partially correcting the clubfoot thereby making the surgical procedure less extensive.

Indications for Surgery.^(14,17,5,3,4)

1. Deformity that does not respond to the conservative treatment of serial manipulation and casting.
2. When deformity has recurred following conservative management.
3. Rigid clubfoot.
4. Any remaining deformity after conservative treatment like fixed varus and equinus of hindfoot.

Turco originally performed a postero-medial release at the age of one to two years.

The advantage of early operative intervention is that maximum remodeling potential of still cartilagenous bones remains. Disadvantage is structures are too small and it is technically difficult.

So in the child aged 6 to 12 months whose deformity has not been corrected by a conservative programme the treatment of choice is a one-stage surgical release usually the Turco posteromedial release.

TURCO'S POSTERO MEDIAL RELEASE: Turco's initial report in 1971 and subsequent 1978 study began a new era in the comprehensive management of clubfoot. The posteromedial release that he described addressed the congenital dislocation of talonavicular joint, concomitant medial displacement of the navicular on talus which he thought was basic to clubfoot deformity.⁽⁵⁾

OPERATIVE TECHNIQUE: Under general anaesthesia and tourniquet control, in supine position and aseptic precautions, a straight medial incision of 6 to 8 cms long extending from the base of the first metatarsal to the tendo calcaneus, it slightly just inferior to the medial malleolus is made. Do not undermine the skin. Expose and mobilize by careful dissection, the tendons of the tibialis posterior, flexor digitorum longus, and flexor hallucis longus and the posterior tibial neurovascular bundle.^(5,3)

Incise the tendon sheaths. Isolate the neurovascular bundle. Divide the master knot of Henry at the junction of flexor digitorum longus and flexor hallucis longus below the navicular bone. Divide calcaneonavicular (spring) ligament. Lengthen the tendocalcaneus by 'z' plasty technique detaching the medial half of insertion on the calcaneus.

Expose the posterior aspect of ankle joint and subtalar joint along with the calcaneofibular ligament and talofibular ligament. Divide the tibiocalcaneal part of the deltoid ligament. Lengthen by 'z' plasty the tibialis posterior tendon. Pull the distal end of tendon and mobilize the navicular by opening the talonavicular joint.

Free the attachment of tibialis posterior to the sustentaculum tali and spring ligament. Release the superficial layer of deltoid ligament from the calcaneus. Evert the foot expose the subtalar joint, cut the interosseous ligament and bifurcated 'Y' ligament, this mobilizes the navicular. Reduce the navicular on to the head of the talus and this will properly align the other tarsal bones. Check the relationship of talus, navicular and calcaneus. Tendocalcaneus and tibialis posterior are sutured.^(10,5,3,4)

Then the abductor hallucis muscle was identified on the medial side of foot and released completely from its origin or even excised. Steindler's stripping that is release of plantar fascia along with the small muscles of foot, was performed whenever there was significant cavus deformity.

After achieving full correction on the table, the tourniquet was released hemostasis secured and skin closed with interrupted simple or mattress sutures. A thick padding of sterile cotton was given. The correction achieved was maintained by a long leg POP cast with the knee in slight flexion and the foot and ankle in fully corrected position. The cast was split open anteriorly in its entire length.^(5,3)

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POSTOPERATIVE CARE: The foot was kept elevated and a watch was kept on distal vascularity and the child encouraged to move the toes. Antibiotics and analgesic were used for up to 5 days. Usually discharged within 2 to 5 days if the postoperative period was uneventful.

FOLLOW UP: After 2 weeks, under general anaesthesia, the plasters were removed and suture removal done; the foot was manipulated and a below knee POP cast applied with over correcting all the deformities.

At 8 weeks postoperative the plaster was removed and parents were advised to encourage the child to walk without external splintage.

ASSESSMENT OF RESULTS: The results were graded as excellent, good, fair and poor depending upon the correction achieved at the end of the followup period.

The criteria used for grading the correction of defromity were:

1. **Excellent:** Healthy thin scar with all the deformities fully corrected and plantigrade mobile foot.
2. **Good:** Healthy scar, foot fully plantigrade and mobile without any equinus or heel varus but with minor degree of persistent metatarsus adductus.
3. **Fair:** Healthy thick scar and One of Two deformities persisting to a moderate degree.
4. **Poor:** A deformed foot with two or more deformities persisting with a thick, contracted scar.

The deformity may be considered cured when there is no adduction or inversion deformity, when there is a hollow on the dorsum of the foot in the position previously occupied by the head of the talus, passive movement to the full calcaneovalgus position, and when the child is able to evert and dorsiflex the foot voluntarily to about a right angle.^(18,15,19)

MATERIAL AND METHODS: The clinical material is composed of 148 children with rigid clubfoot (CTEV) who were admitted and treated in Osmania General Hospital, Hyderabad and other private institutions during the period from Nov 2001 to April 2014. The cases included in the study were children less than age of one year with rigid clubfoot irrespective of previous trial in conservative treatment.

All cases were treated surgically by posteromedial soft tissue release as advocated by Turco, with a slight modification. The deformity and postoperative correction were recorded by clinical photographs. The cases were followed by regular examination, and clinical photographs.

AGE INCIDENCE:

Age group	No .of feet	Percentage
9 to 12 months	74	38.89
6 to 9 months	140	61.11

SEX INCIDENCE:

Sex	No. of cases	Percentage
Male	90	77.77
Female	58	22.23

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LATERALITY:

Side	No. of cases	Percentage
Both feet	68	61.11
Left foot	55	27.77
Right foot	25	11.11

SEVERITY OF DEFORMITY:

Grading	No. of Feet	Percentage
Rigid	214	100

AFFECTED RELATIVE OF PROBONDS WITH CLUBFEET:

RELATIONSHIP	NO. OF CHILDREN
Father	8
Mother	12
Sibcing	4
Grand Parent	2
Uncle	2
Aunt	-
First Cousin	-

Two children had more than one relative with a clubfoot.
28 of five patients had a positive family history.

DISCUSSION: Congenital talipes eqinovarus (C.T.E.V) is commonest of all the foot deformities forming about 80% of the cases. Its incidence is about 1 in every 800 live births being commoner in India, when compared to western countries. The condition is bilateral in about 70% of the cases being commoner in males. The commonest type is idiopathic.

This is one condition where early, effective and continued treatment gives good results, and without treatment the deformity increases, and the foot becomes permanently deformed, with callosities and ulceration.

Hence the deformity should be addressed and classified as early as possible into rigid and non-rigid types. In all cases an attempt should be made to correct the deformity by early conservative treatment. In a child aged 6 to 12 months whose deformity has not been corrected by a conservative programme the treatment of choice is a one stage posteromedial soft tissue release as advocated by Turco.^(14,5,3)

In the present series we have treated 148cases (214feet) of rigid C.T.E.V by one stage posteromedial soft tissue release of Turco with slight modifications i.e. single straight medial incision and without k wire fixation, all the contracted structures on the posterior and medial side were released. The most deforming force on medial side was the tibialis posterior.

The tendons of tibialis posterior, flexor hallucis longus and flexor digitorum lonugs were lengthened by 'Z' plasty. The other important structures that were released medially are abductor hallucis, superficial part of deltoid ligament, spring ligament, master knot of Henry and capsulotomies

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of subtalar, talonavicular, naviculocuneiform and cuneiformo-metatarsal joints. Plantar structures were released to correct cavus deformity.

In our series most of the cases (61%) were on the age group of 6 to 9 months as we believe that the timing of surgery should be such that, when the plaster is removed, the child should be able to start putting full weight on the foot and walk, to prevent any tendency to relapse. Full correction was achieved on the table and postoperatively the foot was immobilized in an above knee POP casing with full correction.

At 2 weeks sutures were removed, foot manipulated under anesthesia and a fresh above knee POP casing applied with overcorrection. At 2 months (8 weeks) the plasters were removed and the child encouraged to walk without support as by now the bones will be held in their new alignment by mature fibrous tissue and further splinting applied in the form of D.B. splint, corrective shoes if required.

The sex incidence was children were 90 males and 58 were females. In 68 cases the deformity was bilateral and the remaining were unilateral. There was left side predominance in unilateral cases. There was internal tibial torsion in cases which was significant (>15 deg.) in legs. One child was arthrogryptic with multiple deformities. Birth history and family history were not significant and milestones were normal in all children. Cases had conservative treatment previously which was unsuccessful.

In all cases we have performed a one stage posteromedial soft tissue release. After an average follow-up of 62 months the results were excellent in 129 feet, good in 69 feet and poor in 6 feet. When excellent and good results were combined the result was satisfactory in all feet out of the 202 feet which were followed up.

Twelve patients did not turn up for follow up. The unsatisfactory results were due to wound infection, scarring or noncompliance with plaster immobilisation. The complications of postoperative in period were gaping in suture line in 14 cases skin necrosis was seen in eight cases.

CONCLUSIONS: Congenital talipes equinovarus (C.T.E.V) is commonest of all foot deformities being commoner in male children and bilateral in 61% of cases, idiopathic type being the commonest form.^(13,18)

The deformity should be addressed as early as possible and classified into rigid and non-rigid types. All most all rigid or resistant types require surgical correction. The procedure of choice being one-stage posteromedial soft tissue release.^(15,16,5)

The posteromedial release as described by Turco is an excellent procedure if properly performed at an appropriate time. Once surgery is performed, it should be a complete posteromedial release and never be done half-heartedly, since the scarring and fibrosis with repeated surgeries will interfere with the correction.

The best time of surgery is at the age of 9 months to one year because when the plaster is removed, the child should be able to start putting full weight on the foot and walk, to prevent any tendency to relapse and also because by this age the structures are well developed, there is good remodelling capacity and no permanent bony changes.^(19,5)

Though this is a small series and requires further follow-up until skeletal maturity as is the case with any other congenital deformity. We conclude that one-stage poster-medial soft tissue release performed around the year of age is an excellent way of managing the problem of congenital talipes equinovarus.

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Curvilinear Incision Bil Equinus, Varus, Adduction Deformities



Healed Horizontal Scar Horizontal Incision



Triple Deformities Turcos Intra Operative without K Wire

BIBLIOGRAPHY:

1. Attenborough CG. Early posterior soft tissue release in severe congenital talipes equinovarus. Clin Orthop 1972; 84; 71-8.
2. Herzenberg JE, Radler C, Bor N. Ponseti versus traditional methods of casting for idiopathic clubfoot. J Pediatr Orthop 2002; 22; 517-521.

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3. Turco V.J. – Resistant clubfoot. One stage postero – medial release with internal fixation; A follow up report of fifteen years’ experience. JBJS: 1979; 61; 805-14.
4. Turco VJ. Present management of idiopathic clubfoot. J Pediatr Orthop B 1994; 3; 149-54.
5. Turco VJ. Surgical correction of the resistant clubfoot. One stage posteromedial release with internal fixation; a preliminary report. JBJS 1982; 64; 652-5.
6. Beatson, TR and Pearson JR. A method of assessing correction in clubfoot, JBJS, 488,40,1966.
7. Dobbs MB, Nunley R, Schoenecker PL. Long term follow up of patients with clubfoot treated with extensive soft tissue release. JBJS 2006; 88-A; 986-96.
8. Evans D – Relapsed clubfoot –JBJS: 43B, 722, 1961.
9. Caroll NC. Pathoanatomy and treatment of talipes equinovarus. Symposium: current practices in the treatment of idiopathic club foot in the child between birth and five years of age. Parts 1 and 2. Contemp Orthop 1988; 1, 2.
10. Gray – Text book of anatomy 39th edition, foot and ankle, page no.1507 to 1518.
11. Stewarts. S.F. – Clubfoot its incidence, cause & treatment, an anatomical – physiological study JBJS: 33A, 577, 1951.
12. Irani R.N., and Sherman M.S. – The pathological anatomy of clubfoot JBJS: 45A, 45, 1963.
13. Stewarts. S.F. – Clubfoot its incidence, cause & treatment, an anatomical – physiological study JBJS: 33A, 577, 1951.
14. Hsu WK, Bhatia NN, Raskin A, Ostuka NY. Wound complications from idiopathic clubfoot surgery; a comparison of the modified Turco and the Cincinnati treatment methods. J Pediatr Orthop. 2007; 27(3); 329-32.
15. McKay D.W. – New Concept of approach to clubfoot treatment, J. Pediatr, Orthop, section I-2:347, 1982, section II – 3: 10, 1983, Section III-3 : 141 1983.
16. Ponseti I.V and Smoley E.N. – congenital clubfoot: the results of treatment, JBJS : 45A, 261, 1963
17. McCauley, J.C – Clubfoot CORR: 44:44, 51, 1966.
18. Lehman WB, Silver L, Grant AD, Strongwater AM, Weg O. The anatomical basis for incisions around the foot and ankle in clubfoot surgery. Bull Hosp Jt Dis Orthop Inst 1987; 47; 218-27.
19. Simons G.W. – Complete Sub Talar Release in Clubfoot Part I & Part II JBJS: 67A, 1044, 1985.

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