

EVALUATION OF THREE DIFFERENT SURGICAL PROCEDURES FOR CONGENITAL TALIPES EQUINOVARUS

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ABSTRACT

Objective: To assess and compare the results of three different surgical procedures in congenital talipes equinovarus (CTEV) in children.

Material and Methods: This study was conducted at Lady Reading Hospital Peshawar, from January 1993 to January 1996 and from October 2002 to February 2004. The deformity was classified into 4 grades of severity according to modified Somppi classification. Depending upon the age and the severity of the deformity, 3 different operations were performed: Posterior release, Posteromedial release and Complete subtalar release. The results were rated according to the modified Turco criteria. The patients were followed up to 2 years after surgery.

Results: Study included 38 feet of 30 patients (18 males, 12 females) ranging in age from 4 months to 6 years. There were 10 excellent, 17 good, 6 fair and 5 failure results. The outcome of surgery was related with the grade of the deformity and the procedure employed. In grade II clubfeet the posterior release achieved good results. In grade III, posteromedial release and in grade IV complete subtalar release gave good results. Most of the good or excellent results were obtained in the younger age group.

Conclusion: There is no single surgical procedure, which suits all the cases of CTEV. The best surgical procedure is tailored according to the age of the patient and the severity of the deformity. Best results regarding cosmetic and functional aspects, are achieved in the younger age group.

Key Words: Congenital Talipes Equinovarus, Posterior Release, Posteromedial Release, Complete Subtalar Release.

INTRODUCTION

Congenital talipes equinovarus (CTEV) is a common congenital anomaly of the foot. Its overall incidence is about 1 to 2 in 1000 live births.¹ The male to female ratio is about two to one.² It is a complex deformity consisting of equinus, varus and adductus components.³ It has been defined as subluxation of the talo-calcaneonavicular joint.

If the deformity is properly treated, a painless, functional and plantigrade foot is obtained. But if it is left untreated, it becomes a crippling affliction and creates a great amount of functional disability and social stigma for the patient. There is much controversy in the literature regarding treatment of clubfoot. Conservative treatment is very effective when done during early infancy.⁴ However this may correct only mild cases of clubfoot and surgery is usually required for the moderate and severe forms of the deformity.⁵

There are many types of surgical procedures employed for this deformity. The choice of surgical procedure depends upon the age of the patient, and the severity of the deformity. In the early age up to 6 years the deformity can be corrected by only soft tissue release operations but in the late age group the deformity may require bony procedures for its correction.¹

Attenborough advised posterior soft tissue release operation for the correction of CTEV.⁶ This procedure is best suited for the correction of the residual equinus deformity of the hindfoot when the adductus and varus components of CTEV have already been eliminated by conservative treatment or previous surgical procedures.⁷ This is a small procedure and involves lengthening of the tendo-achilles and capsulotomy of the subtalar and ankle joints on their posterior aspects.

Turco VJ studied the anomaly of the CTEV with great enthusiasm and interest.^{8,9} He

introduced a one- stage posteromedial release operation which produces a plantigrade and pliable foot and reduces the incidence of recurrent deformity. He described two indications for this procedure:

Failure to attain correction after a fair trial of non-operative treatment and

Failure to maintain correction with recurrent deformity.

The upper age limit of the child for this procedure is up to 6 years. However, best results are achieved in the age range of 1-2 years.

Mckay (1982) presented a new concept about the pathological anatomy and treatment of CTEV.^{10,11} According to him the complex deformity of CTEV results from abnormal rotation of the calcaneus under the talus in the sagittal, coronal and horizontal planes. He designed four-quadrant release operation (posterior, medial, plantar and lateral release), also known as complete subtalar release, performed in one stage for the correction of the CTEV. This procedure is recommended only for severe and resistant cases of clubfoot which can not be corrected by less extensive soft tissue release operations. Dobb, Nunley and Schoenecker have found a correlation between the extent of soft tissue r lease and the degree of functional impairment.¹² Because of the availability of multiple surgical procedures for the correction of CTEV and because of the good results achieved by surgery in the early age patients of this deformity, R.W. Porter has aptly stated that failure rests more in surgeons hand than in the child's foot.¹³

This study was designed to evaluate three different soft tissue release operations for the correction of CTEV deformity in children from the age of four months up to six years.

MATERIAL AND METHODS

This is a prospective study of 38 feet of

30 patients having CTEV deformity. This study was conducted in the Orthopedic Unit of Lady Reading Hospital, Peshawar. The study was completed in two periods, from January 1993 to January 1996 and from October 2002 to February 2004. The following inclusion and exclusion criteria were used:

Inclusion Criteria:

Only congenital cases of talipes equinovarus deformity

Either Sex

Age group: from 04 months up to 06 years.

Exclusion Criteria:

Paralytic clubfoot as in poliomyelitis, cerebral palsy or nerve injury

Teratologic clubfoot associated with arthrogryposis multiplex congenita, myelomeningocele or diastrophic dwarfism

Cases below 4 months of age and above 6 years of age.

A detailed history, clinical evaluation and laboratory investigations of each patient were recorded on a proforma. An anteroposterior and a forced dorsiflexion lateral view radiographs were obtained for each patient preoperatively.

The severity of the deformity was classified according to the modified Somppi Classification adopted by Shah and Saleem¹⁴ as follows:-

- Grade I: Mild or postural clubfoot
- Grade II: Moderate clubfoot which can be manipulated partially to neutral position
- Grade III: Severe clubfoot, which cannot be manipulated into neutral position
- Grade IV: Resistant and recurrent cases of

RESULTS AS RELATED TO THE SEVERITY OF THE DEFORMITY

Procedure	Number of Feet	Grade of Severity of Deformity	Results			
			Excellent	Good	Fair	Failure
Posterior Release n=8	6	Grade II	1	4	1	0
	2	Grade III	1	0	0	1
Posteromedial Release n=18	8	Grade II	3	5	0	0
	6	Grade III	2	2	2	0
	4	Grade IV	0	1	1	2
Complete Subtalar Release n=12	4	Grade III	1	2	1	0
	8	Grade IV	2	3	1	2
Total	38		10 26.32 %	17 44.74%	6 15.79%	5 13.16%

Table 1

RESULTS AS RELATED TO THE AGE OF THE PATIENTS

Operative Procedure	Age to operation	Number of Feet	Results			
			Excellent	Good	Fair	Failure
Posterior Release	4 months to 11 months	3	1	2	0	0
	12 months to 35 months	2	1	0	1	0
	3 years to 6 years	3	0	2	0	1
Posteromedial Release	4 months to 11 months	7	3	4	0	0
	12 months to 35 months	8	2	3	2	1
	3 years to 6 years	3	0	1	1	1
Complete Subtalar Release	4 months to 11 months	2	1	1	0	0
	12 months to 35 months	4	2	0	1	1
	3 years to 6 years	6	0	4	1	1
Total		38	10 26.32 %	17 44.74%	6 15.79%	5 13.16%

Table 2

clubfoot deformity and the residual deformity after incomplete surgical correction

Depending upon the age of the patient and the grade of the deformity, the following procedures were performed:-

1. Posterior release.
2. Posteromedial release and
3. Complete subtalar release.

Posterior release alone was performed for cases which had only residual equinus deformity of grade II or grade III severity. Posteromedial release of Turco was performed in those cases who had clubfoot deformity of grade II or grade III and in some cases having grade IV deformity as well. Complete subtalar release of McKay was performed mostly in patients having grade IV deformity and in some patients of grade III deformity as well.

A uniform follow up was adopted for all cases in this series. In the first 3 months after surgery, the patients were followed up at intervals of 2 weeks, 6 weeks and 12 weeks. Later on the patients were followed up at intervals of 3 months up to total period of 1 ½ to 2 years. The total period of immobilization in the plaster cast was upto 3 months. At the end of this period, the functional and cosmetic aspects of the results were noted. The criteria used by Turco for assessment of the results of clubfoot surgery were applied to all these cases.^{8,9} We used these criteria in a modified manner, giving more importance to clinical evaluation as compared to radiological evaluation. The child was referred to orthopedic workshop for preparing a clubfoot splint. For a walking child a pronator shoe was also prepared. At each follow-up, the patient was assessed for any recurrence,

residual deformity or functional impairment of the foot.

RESULTS

This is a short series of 30 patients (38 feet) treated surgically for correction of clubfoot deformity. Out of 30 patients, 18 were male and 12 were female. The male to female ratio was 3: 2. In 22 cases the deformity was unilateral whereas in 8 cases the deformity was bilateral and both the feet were operated. Thus, in 30 patients, the total number of operated feet was 38. The age range of the patients was from 4 months up to 6 years.

Out of total 38 feet, 30 were primary deformities of CTEV which had no prior surgical procedure and 8 were relapsed deformities in which prior surgical procedures had failed.

Of the 38 feet, 14 (36.84%) were grade II, 12 (31.58%) were grade III and 12 (31.58%) were grade IV deformities. None of the feet having grade I deformity was included in the study because it is treated conservatively. Procedure performed were Posterior Release (n=8), Posteromedial Release (n=18) and Complete Subtalar Release (n=12).

In this series, according to modified Turco criteria, there were 10 excellent, 17 good, 6 fair results and 5 failures (table 1). Some minimal residua which were cosmetically as well as functionally acceptable were present in most of cases such as calf atrophy, pes planus, pliable metatarsus adductus and decreased size of the foot.

Of the 5 failures, one was having grade III deformity preoperatively and 4 had grade IV deformity. There was no failure in grade II clubfeet. This showed an increased risk of failure with increase in the severity of the deformity.

POSTOPERATIVE COMPLICATIONS

S.No	Complication	No. of Feet	Percentage
1.	Injury to neurovascular bundle	3	7.89
2.	Tourniquet skin blisters	3	7.89
3.	Skin flap necrosis and wound dehiscence	4	10.52
4.	Wound infection i. Superficial ii. Deep	5 1	13.15 2.63
5.	Pin tract infection	2	5.26
6.	Postoperative pyrexia	6	15.78
7.	Residual deformity i. Forefoot adduction ii. Equinus iii. Varus heel iv. Valgus heel	8 4 2 2	21.05 10.52 5.26 5.26
8.	Functional impairment due to pain & stiffness	10	26.32
9.	Failures	5	13.15

Table 3

Functional impairment of the foot due to pain and stiffness was found in 10 feet. Of these 4 were of grade III and 6 were of grade IV deformity. Moreover, amongst these 10 clubfeet, 4 were primary clubfeet and 6 were relapsed clubfeet. This indicated that the complication of functional impairment increased with repeated surgery and with the grade of the deformity.

Posterior release (n=8 feet) had excellent results in 2 (25%) cases, good results in 4 (50%) cases, fair results in 1 (12.5%) case and failure in 1 (12.5%) case. Posteromedial release (n=18 feet) had excellent results in 5 (27.8%) cases, good results in 8 (44.4%) cases, fair results in 3 (16.7%) cases and failure in 2 (11.1%) cases. Complete Subtalar Release (n=12 feet) had excellent results in 3 (25%) cases, good results in 5 (41.7%), fair results in 2 (16.7%) cases and failure in 2 (16.7%) cases. Overall 38 feet had excellent results in 10 (26.3%) cases, good results in 17 (44.7%), fair results in 6 (15.79%) cases and failure in 5 (13.16%) cases. The results related to the severity of deformity (table-1) and age of the patients at the time of surgery (table-2) and the complications found after surgery (table-3) are presented as follows:

DISCUSSION

CTEV is an interest-provoking problem for an orthopedic surgeon, because most of these children usually have no other mental or physical abnormality except the stigma of this crippling

deformity. Most orthopedic surgeons agree that a fair trial of non-operative treatment should be given in every case of CTEV before embarking on surgical treatment. This will differentiate the pliable cases, responding favourably to non-operative measures, from the resistant cases which require surgery.¹

Many authors have used clinical as well as radiological criteria for the assessment of the results after clubfoot surgery.^{8,9,15} In this study more importance was given to clinical evaluation, because difficulty was found in radiological evaluation of some of the small feet of the younger patients. Moreover, Ippolito et al¹⁶ have questioned the validity of talocalcaneal angle (Kite's angle) in the anteroposterior radiograph of the hind foot correction after surgery. There are many divergent opinions regarding the best age of the child for surgery and the choice of the surgical procedure. Great difficulty arises in comparing the results of surgical procedures performed at different centers because there are pre-operative variables like the severity of the deformity, the age at surgery and the previous non-operative treatment or operative treatment received by the child. Unfortunately the current classification systems for the analysis of the CTEV are not entirely satisfactory and it may be difficult to predict appropriate management or to compare the results after management.¹⁷

Lau et al¹⁸ reviewed 153 clubfeet treated surgically. Out of these 64 feet underwent

posterior release operation in which tendo-achilles lengthening was combined with posterior capsulotomy of talocalcaneal and tibiotalar joints. The authors have claimed good results from this procedure. We performed this procedure in selected group of 8 patients who had only residual equinus deformity. The results were excellent in 2 patients, good in 4 patients, fair in one and poor in one patient. Similarly Ippolito et al^{16,19} have reported that limited posterior release operation along with manipulation and casting techniques, affords good results. They had performed three dimensional C.T. reconstruction of the whole foot and found that cavus, supination and adduction deformities were corrected much better in selected patients.

Turco reviewed 240 resistant club-feet treated by one-stage posteromedial release with internal fixation.^{8,9} The ages of the patients ranged from 6 months to 8 years. He reported 83.8% excellent or good results. The best results with least incidence of complications were in children who were operated between one and two years of age. A similar finding was noted in our series of patients who underwent Turco's posteromedial release. Among 18 feet there were 13 excellent or good results. Most excellent or good results were achieved in the early age group. The number of poor results and fair results increased with the increase in the age of the patients.

Mckay in 1982 and Simons in 1985 advocated complete subtalar release for the correction of C.T.E.V.^{10,11,15} Since then many authors have preferred this procedure to the less extensive release operations. Centel et al²⁰ compared the results of posterior release, posteromedial release and Simons technique of complete subtalar release in 77 patients. According to them Simons technique was found to be the most efficient method of surgery both functionally and radiologically in cases of C.T.E.V. Tschopp et al²¹ also achieved better results with complete subtalar release as compared to posteromedial release. In our series 12 patients underwent this procedure and 8 patients had good or excellent results. This extensive release operation may result in a more complete correction of the deformity but the risks of over-correction and limitation of the movements of the foot are increased.²² We selected this procedure for the most severe and resistant cases of clubfoot.

The post-operative infection rate was quite high in our series. There were five cases of wound infection and two cases of pin tract infection, among 38 feet operated. Uglov and Clarke²³ have reported infection rate of 1.1% in their series. This difference in rate of infection may be because our sterilization standards and cleanliness of the

operation theatre environment may not be up to the mark, in contrast to the developed countries. Moreover our experience with the extensive release operations was limited and extensive dissection might have devascularized the tissues in some cases leading to infection.

CONCLUSION

Surgical treatment of CTEV results in a lasting correction and a plantigrade and functional foot. No single surgical procedure is suitable for all cases of CTEV. The extent of surgical release must be tailored to the type and severity of the persisting deformity of the foot and the age of the patient at the time of operation. From this study it is clear that posterior release, postero-medial release and complete subtalar release, all afford good results in selected group of patients. Moreover this study indicates that all the procedures are more effective when performed at a younger age. We consider 4 months of age as the best age for surgery after the non-operative measures have failed to correct the deformity.

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