

Functional Outcome and Satisfaction in Patients with Neglected Talipes Equinovarus Deformity after Triple Arthrodesis in a Rural Hospital Setting - A Prospective Cohort Study

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Research Article

Abstract: The aim of the study was to determine the functional outcome and patient satisfaction after triple arthrodesis procedure done on patients with neglected Talipes Equinovarus in a rural tertiary care setting. **Methods:** This was a prospective cohort study done on 22 successive participants with talipes equinovarus deformity who underwent triple arthrodesis. The functional outcome was measured by Ankle Hind foot Scale of American Orthopaedic Foot and Ankle Society and patient satisfaction with a 5 point Likert scale. **Result:** Out of 22 cases, satisfactory functioning was reported according to AOFAS AHS in 94% of cases. There was statistically significant improvement in the AHS score showing the better functional outcome with TRA and 95% patients were satisfied with the outcome. **Conclusion:** Triple arthrodesis still remains an excellent salvage procedure for neglected Talipes Equinovarus cases with very high patient satisfaction and good functional outcome.

Keywords: Triple arthrodesis, talipes equinovarus, functional outcome, satisfaction, Ankle hind foot score.

Introduction

Triple arthrodesis (TRA) as a procedure for treatment of equinovarus deformity was first described by Edwin W Ryerson in 1923 for achieving a stable, painless plantigrade foot in paralytic or deforming conditions like polio, cerebral palsy, congenital talipes equinovarus (Club foot/ CTEV) (1,2). The procedure involves simultaneous fusion of three joints namely subtalar, talonavicular and calcaneocuboid. The basis of the procedure is that it allows correction of deformities in three planes at right angles to each other (3,4). Several variations of the procedure have been described to suit various clinical situations depending on which deformity predominates like the Lambrinudi modification, the Hoke-Kite procedure, the addition of tendon transfers to balance the muscles if muscle imbalance is the cause etc. The procedure is reserved for patients over the age of 10 yrs. However there are studies which document its use in younger patients with excellent results and good

union (6). Currently triple arthrodesis is done in the western world mainly for post traumatic or degenerative arthritis of the hind foot (9). However in India, where appropriate treatment for clubfoot has had limited availability; there remains a large number of cases of neglected clubfoot, which may benefit from this procedure (11). Owing to lack of access to trained personnel, social taboos and congenital anomalies being seen as a "blessing from God", many patients have reached adulthood with an untreated severe deformity. Young adults with these deformities are often reluctant to enter the social mainstream and as a result are disadvantaged socially, physically and economically. Despite some studies about the possibility of late degenerative arthritis most of the patients wished "to look normal" that is to have a plantigrade foot (8,9,10). Several studies document the efficacy of this procedure in treatment of equinovarus deformity (4). Arthrodesis remains a very common operation in low income countries for adults presenting with a painful deformed foot (12). Triple arthrodesis represents the single most effective procedure capable of delivering a stable, plantigrade and painless foot in patients with foot deformities involving the mid and hindfoot of various etiologies (3, 4). Aim of the study was to evaluate the functional outcome and patient satisfaction following triple arthrodesis in patients with neglected talipes equinovarus deformity done in a rural setting and compare the functions before and after triple arthrodesis.

Materials and Methods

The study was conducted in a prospective cohort design on patients who underwent triple arthrodesis for neglected talipes equinovarus deformity over a 9 year period from 2005 to 2014 at a rural tertiary care centre. Study was commenced after obtaining the ethics

committee permission and with the informed consent from the participants. We did not attempt to predetermine by statistical calculation the size of the study population. All consecutive patients between the age of six years and fifty years who underwent triple arthrodesis for correction of neglected talipes equinovarus deformity were recruited. Those having hip and knee pathologies and those with prior surgeries other than posteromedial soft tissue release were excluded. All participants were invited for data collection by a letter. Patients were reviewed at the outpatient clinic between January and February 2014. Further missing data were collected from the patient records available in the hospital. The study evaluated the functional outcome and patient satisfaction following TRA and compared the ankle joint functioning before and after the arthrodesis. Patient characteristics like age, gender, smoking and time to ambulation were studied for significant association with functional outcome and satisfaction. Ankle Hind foot Scale (AHS) of the American Orthopaedic Foot and Ankle Society (AOFAS)

comprising pain(40),function(50) and alignment(10)pts was used to rate the functional outcome. This 100pt rating score at its best representing a foot with pain free, full range of motion, no instability and good alignment, able to walk 600metres without aids or limitations. Maximum score attainable in triple arthrodesis is 94, since the subtalar joint is arthrodesed. Good function is taken as feet with an AHS score of more than 55. Patient satisfaction was assessed on a 5 point Likert scale, 1 as very unsatisfied and 5 as very satisfied.

Results

The descriptive statistics of frequency and percentage were used to analyse demographic data like age, sex, occupation, symptoms, signs, complications. The Wilcoxon signed-rank test was used to compare the pre and post operative AHS scores and the sub parameter scores of the AHS. The triple arthrodesis was done on 22 limbs in eighteen patients and the analysis was done assuming a participant number of twenty two.

Table 1: Age and gender distribution of participants

Sl. No.	Gender	5-19yrs	20-29yrs	30-39yrs	40-49yrs	Total	Percentage
1.	Male	3	4	2	0	9	50
2.	Female	1	3	1	4	9	50
Total		4	7	3	4	18	100
Percentage		22.22	38.88	16.66	22.22	100	100

Among the eighteen patients nine were female and the rest were males. The majority was in the age group of 20 to 30 yr; 7(39%), followed by the 5 to 19 yr age group and the 40 to 49 yr age group with 4 cases each(22.22%). Mean age of the patients was 27.89 (median 26.5) with an S.D. of 11.26yrs. The age range varied from a minimum of 7 years to a maximum of 45 years. The peak age group represents the young adults who are in potentially the most productive phase of their life but find themselves inhibited both functionally and socially by the deformity. The 20 to 50 yr group accounts for 14 out of 18 patients (77%) of cases representing the effects of inadequate treatment for the deformity in the past 4 decades. The low number in the 5 to 19 yr age group represents the better availability of treatment in the last decade. Four patients had bilateral deformity and of the bilateral cases 3 were male and one was female. The right leg was involved in 15 (68.2%) and left side in 7 (31.8%) cases.

Table 2: Etiology of talipes equinovarus deformities

Etiology	Frequency	Percentage
Neglected CTEV	17	77.3
Post-polio residual paralysis	4	18.1
Cerebral Palsy	1	4.5

The underlying etiology for the deformity in four patients was poliomyelitis and in one case it was cerebral palsy while in the remaining seventeen feet the etiology was neglected CTEV (77.3%). In neglected CTEV deformity, the right side was affected in 11(50%) and the left in 6 (27.3%). In all the patients with bilateral deformity, the etiology was CTEV.

Table 3: Symptom distribution associated with talipes equinovarus

Symptoms	Frequency	Percentage (%)
Deformity	22	100
Pain	21	95
Limitation of activities	22	100

Twenty one feet had pain (95%) with painful callosities in twenty feet (91%) and all feet had deformity and limitation of activities preoperatively, Equinus, varus and adductus deformities were present in all feet. Cavus was present in 14 feet (63.63%).

Table 4: Patient outcome measures after TRA

	Patient Satisfaction Likert Scale	Time to ambulation in weeks	Function domain pre-op (AHS)	Functional domain Post-op (AHS)	Function difference
N	22	22	22	22	22
Mean	4.64	16.00	21.9545	33.9545	12.0000
Median	5.00	16.00	21.5000	34.0000	13.0000
Std. Deviation	.581	1.633	3.94579	6.78568	5.10835

Analysing the 22 feet for satisfaction, the mean score was high upto 4.64 with a median value of 5.00. 21 patients (95%) were either satisfied or very satisfied, only one patient (4.5%) was neither unsatisfied nor satisfied. No patients were unsatisfied with the procedure. The mean time taken for ambulation was 16 weeks. The pre-op function scores in AHS scoring improved from a mean of 21.95 to 33.95 with a function difference score of 12. Average follow up was 6 years, ranging from 2 years to 8 years.

Table 5: Post -op AHS score categories

AHS Score	Frequency	Percentage (%)
Poor (AHS<55)	1	4.5
Good (AHS 55-74)	4	18.18
Excellent (AHS 75-94)	17	77.27

AHS score of less than 55 was taken as poor, 55 to 74 as good, and more than 75 as excellent. 21 (95%) feet were found as good or excellent and only one foot had a poor result (4.5%).

Table 6: Wilcoxon signed rank test for the AHS score and TRA

	N	Pre operative (Mean)	Post-operative (Mean)	Z	Asymp. Sig (2 tailed)
Pain (40 points)	22	26.36	38.18	4.099	0.000*
Alignment (10 points)	22	00	8.86	4.354	0.000*
Function (50 points)	22	21.95	33.95	4.052	0.000*
Total score	22	48.36	80.55	4.111	0.000*

(* p value < .05)

All the 22 feet were analysed as independent participants and the pre-op and post-op score were compared. AHS score domains of pain scored 26.36 during pre-op period and 38.18 after the procedure showing improvement in the pain scores. As there was deformity prior to surgery, pre-op alignment score was zero for all participants which improved after the TRA to a mean value of 8.86. Functioning improved from a pre-op mean score of 21.95 to 33.95 after the procedure. Total AHS scores improved from 48.36 to 80.55 after TRA. The pre and post TRA score were analysed with Wilcoxon signed rank test for significant association. Pain, alignment, function and AHS total scores showed significant association to TRA with a Z score of 4.099, 4.354, 4.052 and 4.111 respectively with a p value less than .05 which shows a very strong association. Looking into the attitude of the patients towards the TRA, 90% would undergo the procedure again all things being the same. 94% would recommend the procedure to another patient.

Discussion

Neglected equinovarus deformity is a major cause of disability in the developing world. Triple arthrodesis is an effective procedure for correcting neglected talipes equinovarus deformities in resource

poor circumstances in rural settings . It provides a painless, stable, plantigrade foot. This procedure is being used for both congenital and acquired deformities. The majority of patients requesting such correction are in the 20 to 30 year age group. The number of patients in the 10 to 20 year group is less probably reflecting improved treatment of CTEV over the last 2 decades. The surgical expertise needed, complex effects of joint resections and the associated adverse outcomes always make this procedure a challenge to the surgeon and raises the question of feasibility in rural care settings where the resources are limited. In our series only one patient had poor functional outcome and majority (95%) had good function. The median AOFAS AHS score in our study was 80.0, this compares favourably to the median scores obtained by Pell 60.5(4) and Ingrid 63.0(15). 86% of patients were satisfied or very satisfied with the outcome of the procedure. 90% would undergo the procedure again all things being the same. 94% would recommend the procedure to another patient. Patient satisfaction showed close correlation with AHS score. 95% of patients were satisfied with the outcome of the procedure. Better ankle range of motion did not correlate with patient satisfaction which contradicts the findings from the available

literature related to the procedure. The study findings gives the authors immense confidence in concluding that TRA as a foot salvage procedure, is feasible in a limited resources setting and has a good functional outcome and patient satisfaction. The strengths of the study includes many factors like the study design being a prospective cohort design, long term follow up of up to 9 years, giving strength to satisfaction and functional outcomes. The statistical analysis is strong enough to find out significant association between procedure and outcomes. The evidences are generalizable as the study setting is a rural Indian setting. We readily acknowledge the limitations like, the small sample size, since it is an expensive procedure when done in an out- of- pocket expenditure setting. Intermittent follow up of patients which would have added more data and strength to the study could not be done owing to the financial constraints.

Conclusion

The triple arthrodesis procedure gives excellent functional outcome and very good patient satisfaction in patients of neglected equinovarus deformity requiring deformity correction and a painless, stable foot. The procedure is feasible in limited resource rural settings.

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