

Role of age in management of clubfoot by ponseti method and relapse rate

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Abstract: *Background:* With all the stirring advances in modern medicine, it is somewhat sobering to assess the fund of knowledge concerning the treatment of clubfoot. Evolution of treatment started with manipulation, strapping etc.; with not much enthusiastic results. Surgical intervention came into scene; with not much success and lasting morbidity. Over the past decade, Ponseti management has become accepted throughout the world, as the most effective and least expensive treatment of clubfoot. Does the age at beginning of treatment has influence, in Ponseti method and rate of relapse is uncertain. *Aims and objectives:* (1) Role of age at beginning of treatment. (2) Relapse rate. *Materials and method:* 58 patients were enlisted for study with 96 idiopathic club feet treated by Ponseti method at Al Ameen Medical College Hospital and its ancillary branches between 2006-2012; with minimum follow up of 30 months. Two groups were made, group I with age ≤ 6 months of age and group II with age > 6 months. *Results:* Average number of casts necessary to achieve correction in group I was 5.28 casts (range 4 to 8 casts); while in group II was 7.31 (range 6- 11 casts). Percutaneous tenotomy was needed in 85.42% of feet. Relapse rate was 7.14% (5 feet) in group I while 15.3% (4 feet) in group II. *Conclusion:* Effectiveness of Ponseti technique in achieving the correction of deformity and functional as outcome increases with early age of initiation of treatment while relapse rate increases with increase in age.

Keywords: Age; Clubfoot; Ponseti Method; Percutaneous Tenotomy; Relapse.

Introduction

Clubfoot, commonest congenital deformity; first depicted in ancient Egyptian paintings and first described in medical literature by Hippocrates in 400 BC. He suggested treatment should be started as soon as possible after birth [1]. The treatment of CTEV started in ancient times in form of manipulation with strapping/casting, etc. Initially it was Kite's technique which gave excellent results [2]. However, his results were not reproducible; this was repeated by conservative/operative treatment. The dilemma faced by surgeon was that even after the surgery the clubfoot recurs and results in more surgeries and morbidity [3].

Historically it has been difficult to correct and difficult to maintain once corrected. Its treatment has been controversial throughout the last 150 years [1]. Long term follow up of clubfoot treated by surgery led to worst gravity of life in adulthood; which contributed to the decline in enthusiasm for surgery; because repeated surgeries resulted in stiff painful and arthritic foot

and considerably impaired quality of life. Ever since introduction of Ponseti method; which gained maximum popularity and is reportedly effective for treating clubfoot in children up to 9 years of age [4]. Many groups have reported their success with technique in completely different economies, culture and healthcare settings [5]. It is believed that manipulation should be started as soon as possible [6]. Whether the age, at beginning of treatment influence the degree of correction, in Ponseti method and rate of relapse, is however unknown. We therefore first asked whether age at presentation and initiation of treatment (i.e. younger or older than 6 months) influenced correction rates, recurrence rates. We then asked, does the number of casts, tenotomies and success in form of initial correction differed; by age at beginning of treatment.

Material and Methods

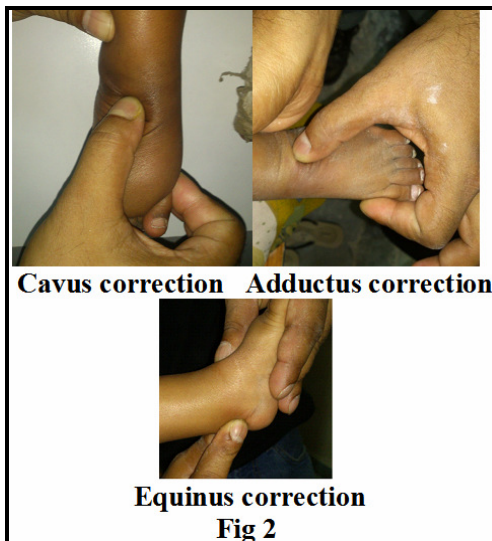
A study was conducted in Al Ameen Medical College and its ancillary branches between

2006- 2012. The source of data is, all confirmed cases of clubfoot.

Inclusion criteria: (1) Idiopathic clubfoot. (2) Virgin clubfoot.

Exclusion criteria: (1) Secondary clubfoot.(2) Previously treated clubfoot; either conservative or surgical.

We divided the patients into two groups depending on age. Group I – younger than 6 months; Group II -older than 6 months. Oldest patient in this series was 34 months. Group I included 28 boys and 14 girls with 70 clubfeet treated in 1st 6 months of life; group II included 12 boys and 4 girls with 26 clubfeet treated after 6 months of age.



In group I, mean age at the beginning of treatment was 26.4 days (range 1- 160 days) minimum follow up for group I was 30 months (mean 41.3 months; range 30–61months). In group II mean age at beginning of treatment was 432.8 days (range 180-913 days) minimum follow up for this group was

30 months (mean 41.3 months range 30–55 months). The protocol followed was same in all cases. We performed manipulation casting tenotomy and bracing. The cavus was initially corrected by supinating and gently abducting the forefoot in proper alignment with the hind foot (Fig:1-2). With the longitudinal arch of foot well moulded and the fore foot in slight supination, the foot was gradually abducted under the talus, which was secured against the rotation in the ankle mortise by applying counter pressure with the thumb against the lateral aspect of head of talus (Fig:3-4) [4-6].

If residual equinus was observed once the foot had been abducted to 40° to 70° a percutaneous tenotomy was performed under local/general anaesthesia and the foot was immobilised in final cast on achieving the correction with 40°-70° of abduction, 10°-20° of dorsiflexion [7]. After 3 weeks in final cast, a foot abduction orthosis (FAO), consisting of a Dennis Browne bar and straight shoe was applied (Fig: 5-6). The distance between the shoe heels in the bar was adjusted to match the distance between the shoulders. The shoes were turned to 40°-70° of external rotation in bilaterally affected children and 40°-70° of rotation on clubfoot side and 45° of rotation on normal foot side in unilaterally affected children [8]. The FAO was used for 23 hours per day for the first 3 months and then at night and during naps.



We considered the foot “corrected” when it was clinically possible to achieve at least 15° of dorsiflexion, 40°-70° of abduction, a neutral or slightly valgus heel and a straight lateral foot border (Fig 6) [9]. Later loss of dorsiflexion, varus of the heel, or dynamic supination was identified as “relapse” [10].

We recorded the patient’s deformity correction, compared the number of casts needed to achieve correction and the rate of relapse. We used Chi Square test to compare these categorical variable for group I and group II.

Results

Average number of casts necessary to achieve correction in group I was 5.28 (range 4-8 casts) (Table 1). Tenotomy was needed in 81.43% of the cases. At a mean follow up of 41.3 months, there were five feet (7.14%) of relapse. In 3 feet, the reason of relapse was identified as intolerance to brace, which later on went for PMR whereas the other 2 feet have been treated with a new series of casting and later bracing.

Average number of casts necessary to achieve correction in group II was 7.31(range 6-11) (Table 2). Tenotomy was performed in 96% of cases. At a mean follow up of 41.6 months, 4 feet (15.3%) had relapse which later on went for PMR. P-value by chi-square test for age groups (I &II) is far less than 0.05, thus highly significant (Table 3), showing that the age at beginning of treatment in Ponseti method does influence the correction of deformity, in the form of number of casts required to achieve it.

Table-1: Group I						
Age Range (Months)	Male		Female		Average no. of cast	Total average cast
	28		14			
	B/L	U/L	B/L	U/L		
	20	8	8	6		
>0-1	4		0		4.50	5.28
>1-2	6		0		5.33	
>2-3	12		7		4.62	
>3-4	11		8		4.94	
>4-5	8		6		5.64	
>5-6	7		1		7.38	
Total foot	48		22			

Table-2: Group II						
Age Range (Months)	Male		Female		Average no. of cast	Total average cast
	12		4			
	B/L	U/L	B/L	U/L		
	6	6	3	2		
>6-9	2		1		06.00	7.31
>9-15	4		2		06.33	
>15-20	6		3		06.89	
>20-25	4		2		08.50	
>25-30	1		0		10.00	
>30-35	1		0		11.00	
Total foot	18		8			

Table-3: Groups		
Groups	No. of cast	
	≤ 6	> 6
Group I	60	10
Group II	11	15
P-value << 0.05		

Discussion

Our study included the initial patients treated with Ponseti method in Al Ameen medical college hospital and its ancillary units and therefore constitutes experience with a learning curve.

The study has some limitations; we did not classify the clubfoot for severity at the beginning

of treatment although many authors suggested initial classification did not relate to success of treatment [11]. The results were not evaluated according to a standardized outcome measure. The mean follow up of 41.4 months is relatively short and 46.4% of children; including both groups are still using FAO. So some additional relapse may be

expected in future. Although imaging techniques are used in understanding and treatment of clubfoot; data obtained from measurement of angles in children might not reflect the gravity of correction obtained in clubfoot. We decided not to perform radiographs in our study; except in cases of relapse for future surgery.

In our study the most common age of presentation was 2.5 months (range 0-6 months) in group I and 22 months (8-34 months) in group II, ratio of male to female children was 2:1. The minimum number of casts in our study to correct adduction and varus in group I was 4 whereas in group II was 6 and maximum was 8 and 11 casts. Relapse rate for group I was 7.14% whereas for group II 15.3%. Hence, the above study and the data evaluate that percentage of effectiveness with Ponseti technique in treatment of clubfoot increases with decrease in age of initiation of treatment, and reduce the relapse rate [12]. Similar studies and conclusions were made by R A Agarwal et al [13] and Ankur Gupta et al [14]; stating the range of number of casts applied increased, as age in beginning of treatment increased and increased pirani severity score. Also in study of Ponseti IV and Smoley E N [15]. Our average number of casts depending on group was comparatively higher to Rebecca Kempa et al study [16].

Relapse rate was definitely more in group II compared to group I, tabulated but not shown statistically significant. As the main reason for relapse, was found to be brace/FAO intolerance and improper use. And in our study brace / FAO was used/ applied, only after the foot was completely corrected. It is generally recognised the results provided by the Ponseti technique are superior to those accomplished with other treatment either nonsurgical/surgical [12]. Although Ponseti technique is not free of complications; we encountered no major problems with the technique, like bleeding after percutaneous tenotomy, rocker bottom foot, etc.

some minor complications like skin blisters, pressure sores, bruise over thigh were encountered which delayed the process some time [10]. Although we share the idea, that the brace intolerance is one of the main difficulties to overcome when applying this technique [8]. We also believe the surgeon must be able to engage the health care team and the family in a synergistic way so brace intolerance and maintenance of correction may be understood as a major goal and responsibility by each person involved in the care of the child with clubfoot [17].

Similar Study, stating whether, Age at beginning of treatment of clubfoot by Ponseti Method, make a difference, was conducted & opined by Christina Alves et al, 2009 [18]. It doesn't. But group II cases (i.e older than 6 months); as stated by them, were already conservatively treated cases (defaulters). Where as our study involved all virgin cases. Thus, age at the beginning of the treatment did influence, the correction of deformity, technique in the form of number of casts required, and relapse. Even though the cases with late presentation too achieved correction, but with extended number of cast and higher chance of relapse.

Conclusion

Age at beginning of treatment does influence, the correction of deformity, effectiveness of Ponseti technique in the form of number of casts required for correction and relapse rate.

Acknowledgements

We thank Dr B.S. Patil Dean AMC, for his guidance and motivation, Dr. Rashinkar Medical superintendent AMCH, our colleagues and post graduates, HOD of Paediatrics and OBG for their help in collection of data and advice rendered during study.

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