RECURRENCE OF DEFORMITY IN IDIOPATHIC CTEV TREATED BY PONSETI TECHNIQUE

Orthopaedics

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ABSTRACT

Congenital talipes equinovarus (CTEV) or clubfoot, is one of the commonest congenital deformity. At present, Ponseti method is most commonly used successful reliable, essentially conservative technique for correction of CTEV deformity and successful in upto 98% of feet. However there is a chance of the relapse or recurrence.

A prospective and observational study after getting institutional ethical clearance was conducted in the department of Orthopedics, at COM and JNM Hospital, Kalyani, Nadai, WB, between August 2018 to July, 2020 including baby with club foot. Total study sample size was 20 according to inclusion and exclusion criteria.

The mean age of presentation was 4 ± 2.51 week. The male to female ratio was 1.86:1. Bilateral feet involvement was 50%. In unilateral involvement, right side was affected 70%, left side was affected in 30% cases. Family history of CTEV was seen in 20% cases. Mean body weight of babies was 2.49 ± 0.17 kg. At presentation, mean pirani score was 5 ± 0.48 . Tenotomy was done 75% cases. Relapse rate was 15%, mean age of relapse was 7 ± 1.73205 month, occurred in most common in left side (66%). There was history of non-adherence of abduction brace for >2 month in all three patients adduction score was 0.5 in all child. Most common deformity relapse was adduction of forefoot.

Ponseti method is cost effective especially in developing country. Strict adherence to brace protocol and good communication between health care persons and parents reduces incidence of relapse. Relapse is relatively common even in Ponseti method and most of cases, it manageable by conservative treatment like cast.

KEYWORDS

CTEV, clubfoot, Ponseti method, Relapse, Recurrence

Introduction :

Congenital talipes equinovarus (CTEV), also known as clubfoot, is common congenital¹ foot deformity in children characterized by : hindfoot equinus, hindfoot varus, midfoot cavus, and forefoot adduction². Although a number of conservative and surgical methods have been proposed to correct the clubfoot deformity, the relapses of the clubfoot are not uncommon. At present, Ponseti method is most commonly used successful reliable, quick^{3,4} non-operative technique for correction of CTEV deformity and successful in upto 98% of feet³. However there is a necessity to investigate the relapse⁵ or recurrence^{2,4,6} pattern, to achieve successful outcome without or reduce relapse.

1. Review of literature:

Congenital talipes equinovarus (CTEV) or clubfoot is one of the most common pediatric foot deformity, with estimated birth prevalence of 1 in 1000 live births^{1,4,7,8} and upto 50% cases, it is bilateral involvement⁸. Although, there are a number of conservative or operative treatments have been used to correct the clubfoot, it is still challenging to treat the most severe cases of clubfoot. For the last 150 years, the treatment methods used for clubfoot are still controversial. Because, the extensive surgical procedures (repeated soft tissue releases) on the clubfoot lead to induce some complications such as stiffness of foot, arthritic problems⁹ and poor quality of life. After that, a number of non-operative¹⁰ methods are proposed to correct the clubfoot deformity with the following techniques such as different methods of manipulations, orthosis or splinting or bracing, casting, and strapping. Historically, conservative management was introduced by Hippocrates in around 400 BC. Later, Kite introduced his method, referred as Kite method^{4,10}, which is including manipulation and casting technique, but the success rate of this method was poor. Subsequently, Ponseti developed a conservative method, called as Ponseti method^{3,10}, with manipulation, casting, Achilles tenotomy and bracing, and it takes about four to five weeks to achieve the full correction of all four components of the clubfoot deformity. In this method, Achilles tenotomy is used to release the equinus deformity and bracing for maintaining the corrected clubfoot, and it helps to obtain the supple, plantigrade, functional, pain-free foot^{3,4,10}. Initial treatment for clubfoot should be a conservative method to correct the clubfoot successfully, the relapses⁵ is still not avoidable. Despite several studies reported that Ponseti techniques provide more successful results, the clubfoot relapses or recurrences of the clubfoot can be still seen in the children with less than 2 years of age followed by the Ponseti method of treatment. Adherence of Ponseti protocol is necessary to achieve full successful clubfoot treatment without relapses of any deformities. Several literatures review articles reported

the technical details and adherence of Ponseti protocol among walking age or older children. There is no definite relapse pattern of the clubfoot, causative factors for relapses. Objectives of this study is to assess recurrence of deformity in idiopathic CTEV treated by Ponseti technique in the term of type of deformity recurrence, severity of deformity, its timing of appearance

Material and Methods :

The study was a prospective and observational study conducted in the department of Orthopedics, at COM and JNM Hospital, Kalyani, Nadai, WB, between August 2018 to July, 2020 including baby with club foot. Approval by the ethics committee of COM and JNM Hospital, kalyani had taken(Ref.No. : F-79/Pr/COMJNMH/S.R.C.15 dated 17.07.2018) and written informed consent of patients of babies obtained to conduct the study. Total study sample size was 20 according to inclusion and exclusion criteria.

Inclusion criteria:

Age : <3 month infants
CTEV foot deformity
Not treated previously

Exclusion criteria:

CTEV with congenital anomaly or syndrome or neurological causes of club foot like arthrogryposis multiplex congenital, congenital myotonic dystrophy, myelomeningocele, amniotic band sequence, spina bifida At visit at orthopaedics OPD of COM & JNM Hospital, <3 month old infant with foot deformity was clinically assessed CTEV deformity. If present, child was assessed for any other syndrome like AMC, meningocele, spina bifida, sign of spinal dysmorphism. If any syndrome/ congenital anomaly was not detected clinically, selected for study as idiopathic CTEV, after getting consent from parents of infant. Then this CTEV child was assessed clinically, Pirani scoring was done, patients demography recorded. Serial manipulation and casting 1 wk interval done. After correction of cavus, adduction deformity was corrected. After correction of cavus and adduction deformity, if dorsiflexion 15° was not possible passively, percutaneous TA tenotomy for residual equinus deformity correction was done and 3 week POP cast to be applied according to standard Ponseti technique.

After correction of deformities and after removal of last plaster, Abduction brace like Steinbeck shoe was applied for 23hr/24 hr for first 3 month, then 12-14 hr/day. Abduction brace size was changed according to size of foot up to 1 year.

After initial full correction of deformity, each child was assessed serially at 3rd, 6th, 9th month, 1yr for pirani score, relapse pattern, severity, time of relapse.

Non-compliance to abduction brace was defined as the inability to adhere to the above mentioned criteria and also delay in changing the splint and shoes as the foot size changed. The parents were instructed to perform range of motion exercises for the ankle and foot when it was out of the brace.

Statistical analysis : The collected data will be organized, tabulated and statistically analysis using IBM,SPSS Statistic for Window version 22. Continuous variable will be expressed as mean $\pm$ standard deviation (sd). For categorical data, frequency was calculated.

RESULTS:

A total 20 children (30 idiopathic club feet) was follow up from August 2018 to July 2020. Each child has been follow up over 1 year from the initiation of treatment. There was no lost follow up. The mean age of presentation was 4 ± 2.51 week. The male to female ratio was 1.86:1. Bilateral feet involvement was 50%. In unilateral involvement, right side was affected 70%, left side was affected in 30 % cases. Family history of CTEV was seen in 20% cases. Mean body weight of babies was 2.49 ± 0.17 kg. At presentation, mean pirani score was 5 ± 0.48 . Tenotomy was done 75% cases and mean pirani score before tenotomy was 1.67 ± 0.24 . Mean pirani score after 3 month of treatment was 0.2 ± 0.25 . Mean plaster required was 5 ± 0.732 .

Pearson correlation efficient (r) between pirani score at presentation and 3rd month of treatment was 0.325 i.e positive correlation. Mean pirani score of tenotomy patients (15 children) was 5 ± 0.46 . Mean pirani score of non-tenotomy children (5 children) was 4.5 ± 0.38 . Pearson coefficient correlation between body weight and pirani score was $r=0.2001$ i.e. positive correlation but it is weak. Compare to pre and post treatment pirani score using paired t-test significant improvement (The t-value is 38.38222. The p-value is $<.00001$).

Initial correction after 1year of follow up of each child, success rate of Ponseti method in our study is 85%.

Relapse rate was 15 %, mean age of relapse was 7 ± 1.73205 month, occurred in most common in left side (66%). There was history of non-adherence of abduction brace for >2 month in all three patients adduction score was 0.5 in all child. Most common deformity relapse was adduction of forefoot. Additional 2 cast was applied for 2 patients, after 2 plaster, one patient was operated for adduction and vauus after 1 yr of age.

DISCUSSION :

Ponseti method is essentially a conservative method, it gives $>90\%$ successful long term result in idiopathic clubfoot^{9,11}. Club foot has inherent tendency to relapse irrespective of treatment protocol. Rate of relapse varies upto 56% by various authors¹². Cause of relapse is non-compliance to abduction brace^{1,4,11,12,13,14,15}, severity of initial deformity⁶, calf muscle atrophy, waek muscle around ankle¹⁶, parental education^{15,17}, female gender¹⁷, higher pre-treatment score¹⁷. But there is no universal definition of non-compliance of abduction brace.

In this study, mean age of presentation was 4week, male child mostly affected, bilateral involvement was in 50% cases. Changulani² et al showed that bilateral involvement in 52%. Ponseti IV, Smoley EN⁶ showed in their study bilateral involvement in 40% cases. Chand S¹¹ et al showed that in unilateral case, right side affected more than left side of foot. In our study, family history of CTEV was in 20% case. Rasit A et al⁸ showed that family history was seen in 24.4 % cases.

In our study, mean body weight of babies was 2.49 kg and mean pirani score was 5. Changulani² et al showed that pirani score at presentation was 5.

Tenotomy was done 75% cases. Changulani² et al showed that tenotomy was done 85% cases. Dyer PJ, Davis N³ showed that tenotomy was done 60% cases, Sharma A¹⁸ showed that tenotomy was done in 76.3 %.

Mean plaster was required 5 in our study. Boehm S¹ in their study showed that cast in idiopathic club foot group was applied 4.5 ± 1.2 .

Pearson coefficient correlation between body weight and initial Pirani

score was positive. Dyer PJ, Davis N³ showed that initial pirani score and number of cast required was positive correlation using chi-square test.

In our study, success rate for correction of deformity in Ponseti method is 85%. Porecha MM et al¹⁰ showed in their study success rate 90% and Zhao D¹² stated that initial correction rate was 89.2%.

Relapse rate was 15% at the mean age of 7 month and adduction of fore foot was common deformity that relapse in our study. Relapse was adduction (pirani score 0.5 in 3 child) and vauus was 0.5 (one child). Boehm S¹ showed that in idiopathic club foot group relapse was in 6 feet out of 22 feet. Changulani² et al showed that relapse was 32% due to lack of compliance to splint. Chand S¹¹ showed that most common relapse was equinus. Ganesan B¹⁴ showed that most common relapse was adduction. Relapse occurs singularly or more commonly in various combination.

Abduction brace is mandatory to prevent relapse¹⁵. Still relapse has proven to be less rigid and easier to treat¹⁹.

Limitation of study: In bilateral clubfeet, only higher pirani score of foot was used as pirani score of child. In our study sample size was small, short follow up period too short.

In conclusion, Ponseti method is cost effective especially in developing country. Strict adherence to brace protocol and good communication between health care persons and parents reduces incidence of relapse. Relapse is relatively common even in Ponseti method and most of cases, it manageable by conservative treatment like cast.

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