

Congenital Club Foot Treated By Of Ponseti Method : A Short-Term Results

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ABSTRACT

Background: Congenital club foot is a complex deformity of foot .It is a collection of different abnormalities, with different etiologies. Consequently, Severity varies with difficulties in evaluating treatment strategies with outcome results. The treatment of congenital club foot remains controversial. Usually, the orthopedist's goal is to obtain anatomically and functionally normal feet in all patients.
Objective: To asses short term follow up result of conservatively treated club feet in relation to the age of initial casting by Ponseti technique.

Methods :A cross sectional observational study with some comparative content done in Al-kindy teaching hospital .A total of 36 patients (44 clubfeet) were treated by Ponseti method during the period of October 2014 to April 2017and were studied prospectively (mean follow up period 6 months, minimum follow-up period of 3 months) . Twenty six patients were male, thus male to female ratio is 2.6 : 1. It involved only patients less than two months. The patients were divided in to two groups: Group (A) included patients less than 4 weeks, while Group (B) between 4-8 weeks of age at the initiation of the treatment. gender, bilateralism, severity of the initial clubfoot deformity measured by Pirani Severity Score System, total numbers of Ponseti casts before the tenotomy, details of tenotomy, compliance with brace were examined. Passive range of movements and look of club foot are evaluated with mean six months follow-up.

Results: We followed the functional Pirani Severity Scoring System and got good to excellent results in 32

patients 88.9 % (37 clubfeet - 84.1%) at mean 6 months of follow up. Ten patients 27.8 % (12 clubfeet - 27.3%) had relapse at varying age; out of which 6 patients 60% (8clubfeet 66.7%) were corrected by Ponseti casting method, while 4 patients 40% (4 clubfeet 33.3%) were resistant to Ponseti method. Poor compliance with the Denis Browne splint and poor cast technique was thought to be the main cause of failure in these patients.

Conclusion: Good understanding the main pathology of club foot, and the ideal method of conservative treatment for correction of the deformities systematically before starting the treatment. In all types of club foot, we start conservative treatment, either as a definite treatment or to make surgical treatment easier for the surgeon and the patient. So Starting the treatment from the first day of life give excellent results and it will be decreased with delay.

Key words : idiopathic club foot , Ponsiti method

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Clubfoot, or talipes equinovarus, is a congenital deformity that typically has four main components; inversion and adduction of the forefoot; inversion of the heel and hindfoot; equines of the ankle and subtalar joint; and internal rotation of the foot. It is estimated that more than 100,000 babies are born worldwide each year with congenital clubfoot. (1, 2, 3).In developed countries, many children with clubfoot undergo extensive corrective surgery, often with disturbing failures and complications. The need for one or more revision surgeries is common. Although the foot looks better after surgery, it is stiff, weak, and often painful. After adolescence, pain increases and often become crippling (4,5).Clubfoot in an otherwise normal child can be corrected in 2 months or less with Ponseti method of manipulations and plaster cast applications, with minimal or no surgery. This was proven by the results of Dr. Ponseti 35-years follow-up study and confirmed in many clinics around the world (6). At least

95% of club foot deformities can be corrected without the need for extensive surgery if the treatment is begun soon after birth (2, 7).The Ponseti method utilize the normal kinetics of the subtalar joint to effect reduction of the club foot deformity. Functionally all the bones of the foot moves as a unit around the talus(7). Most cases of clubfoot are corrected after five to six cast changes and, in many cases, a tendoachillis tenotomy. This technique results in feet that are strong, flexible, and plantigrade. Maintenance of function without pain has been demonstrated in a 35- years follow-up study (6,7).Pirani Severity Scoring system is a reliable and valid method of clinically assessing the amount of deformity present in an un operated congenital clubfoot under 2 years of age.(7) Documenting the amount of deformity allows the treating practitioner (especially if inexperienced) to know where he or she is with respect to the roadmap of treatment, to know when tenotomy is indicated, and to reassure parents regarding progress. It allows

meaningful comparison of results, extraction of subgroups, etc. The Pirani scheme scores six clinical signs either 0 (normal), 0.5 (moderately abnormal), or 1 (severely abnormal)^(6,7,8). Every clubfoot under Ponseti management is "scored" each week for hindfoot score (HS), midfoot score (MS), and total score. Tenotomy is indicated when $HS > 1$, $MS < 1$, and the head of the talus is covered. Ponseti method starts as soon after birth as possible. Make the infant and family comfortable. Allow the infant to feed during the manipulation and casting processes. Casting should be performed by the surgeon. Reduce the cavus is the first element of management by positioning the forefeet in proper alignment with the hind foot.^(6,9) The manipulation consists of abduction of the foot beneath the stabilized talar head. Locate the head of the talus. All components of clubfoot deformity, except for the ankle equinus, are corrected simultaneously. To gain this correction, you must locate the head of the talus, which is the fulcrum for correction (Fig.1)^(6,7,10). Stabilizing the talus provides a pivot point around which the foot is abducted. Next, abducting the foot in supination⁽¹¹⁾. With the foot stabilized by the thumb over the head of the talus, as shown in fig. (1), abduct the foot as far as can be done without causing discomfort to the infant. Hold the correction with gentle pressure for about 60 seconds, then release. The lateral motion of the navicular and of the anterior part of the calcaneus increase as the clubfoot deformity corrects. Full correction should be possible after the fourth or fifth cast. For very stiff feet, more casts may be required. The foot is never pronated. During second, third, and fourth casts the adductance and varus are fully corrected. The distance between the medial malleolus and the tuberosity of the navicular when palpated with the fingers tells the degree of correction of the navicular. When the clubfoot is corrected, that distance measures approximately 1.5 to 2 cm and the navicular covers the anterior surface of the head of the talus^(12,13). Fig (2) note the changes in the cast sequence. The first cast shows the correction of the cavus and adductus. The foot remains in marked equinus. Casts 2 through 4 show correction of adductus and varus.

major decision point in management is determining when sufficient correction has been obtained to perform a percutaneous tenotomy to gain dorsiflexion and to complete the treatment. This point is reached when the anterior calcaneus can be abducted from underneath the talus. This abduction allows the foot to be safely dorsiflexed without crushing the talus between the calcaneus and tibia.

The equinus deformity gradually improves with correction of adductus and varus. This is part of the correction because the calcaneus dorsiflexes as it abducts under the talus. No direct attempt at equinus correction is made until the heel varus is corrected.

Apply the fifth cast with the foot abduction 60 to 70 degrees with respect to the frontal plane of the tibia. Note

the extreme abduction of the foot with respect to the leg and the overcorrected position of foot. The foot is never pronated. This cast is left in place for 3 weeks after complete correction^(7,12,13,14).

Methods: A cross-sectional observational study with some comparative content to evaluate the short-term outcome for management of idiopathic clubfoot. This study was conducted from October 2014 to the first of April 2017 at Al-Kindy teaching hospital orthopedic department. There were 36 patients, 26 patients male and 10 females, so the male to female ratio is 2.6: 1.

The patients were divided into two groups:

Group A; patients less than 4 weeks at presentation to outpatient clinic.

Group B; patients between 4-8 weeks at presentation to outpatient clinic.

Full clinical and functional assessment was done in this study, so patients with bilateral pathology were 8 patients and unilateral 28 patients. The evaluation of patients was based on a Pirani severity scoring system. Inclusion criteria:

1. Patients age 0-8 weeks.
2. Uncomplicated club feet.

Exclusion criteria

1. Complicated club feet.
2. Neuromuscular syndromes.
3. Arythrogyriposis patients.
4. Myelocoele or meningocele.

All patients undergo full and proper Ponseti method including full schedule of casting and tenotomy.

Results: A total number of 36 patients with 44 clubfeet were treated and followed for a mean of 6 months. From the 36 patients, 26 patients (72.2%) were male, thus the male-female ratio is 2.6:1. From the 36 patients, 8 patients (22.2%) had bilateral involvement while 28 patients (77.8%) had unilateral involvement out of which 20 (55.6%) had right foot involvement and 16 (44.4%) had left foot involvement. No relationship had been found with birth order or family history. While beginning of the treatment, 30 patients (83.3%) are in between 1-4 weeks of the age (mean 2 weeks), 6 patients (16.7%) are in between 4-8 weeks of age (mean 6 weeks). At the commencement of treatment, of the 8 bilateral clubfeet patients (16 clubfeet) 7 children (14 clubfeet) had a Pirani severity score of six, and one child (2 clubfeet) had a Pirani score of five. In the unilateral group the mean Pirani score was 5.83 (range 5-6). The mean number of casts that were applied to obtain correction was 6.8 (range 6-8). The more severe the initial deformity and the treatment initiation after 5 weeks of the age, the more casts were required to obtain correction. 33 children (91.7%) needed percutaneous tenotomy, 8 in the bilateral group and 25 in the unilateral group. The mean Mid Foot Score and Hind Foot Score for the entire group at the time of tenotomy was 0.5 and 2.5 respectively.

There was no delay between final cast removal and fitting of Denis -Browne splint. The mean duration of the treatment up to application of the Denis-Browne Splint was 9.6 weeks. Initial correction was obtained in all 36 clubfeet (100%) with the Ponseti method. After four weeks from a full correction (10-11 weeks) were obtained, (ten children 27.8 %) (12 feet - 27.3%) had a relapse of the deformity. The original correction was recovered with the use of repeat application of serial casts in 6 patients (7 clubfeet) while 4 patients (5 clubfeet) were resistant to Ponseti serial cast manipulation and were offered surgery in the form of postero-medial release. All the 6 patients (7 clubfeet) who respond well to repeat application of serial casts were from the 1-4 weeks of the age group while beginning of the treatment. Out of 4 patients resistant to Ponseti serial cast manipulation 2 were from the 4-6 weeks of the age group when beginning of the treatment, while 2 was from the 6-8 weeks of the age at the initiation of the treatment. Two patients developed relapse in the form of equinus deformity at the age of 9 months for which repeat percutaneous tenotomy was done and above knee cast was applied with 15 degree dorsiflexion of ankle, 60 degree of abduction of foot and 90 degree knee bent for 3 weeks. Patient had excellent functional outcome at final follow-up.

Thus, of 10 relapsed patients, 6 patients 60 % (7 clubfeet 58.3 %) had excellent to good functional outcome and 4 patients 40 % (5 clubfeet 41.7 %) had poor functional outcome according to Pirani Scoring System at the mean of six months follow-up. At the mean of eight to ninth week we got (28 patients corrected only) and at the end of the tenth week we got full correction (36 feet 100%). (Table 2) At the end of six months follow-up, we found nearly normal passive range of motion (corrected) in 32 patients 88.9 % (37 clubfeet 84.1%) after managing of relapsed foot (Table 3). The following chart showing the pattern of response to the treatment from the beginning to management. (Fig. 3). Parents of 23 patients (63.9%) accept the look of the clubfoot nearly normal and parents of 9 patients (19.5%) accept the look of clubfoot as normal. We followed the Pirani Scoring System and got good to excellent results in 31 patients (88.9%) at mean 6 months of follow up (Fig. 3). Few complications were encountered. Two children had a plaster sore on the lateral aspect of the skin overlying the talar head. This healed with local dressing only. The mean time to heal the sore was 7 days (range 6-8 days). The corrective manipulation and cast was not applied till the sore heal. However, we don't encounter any allergic reaction to the soft roll, any transitory discoloration of the toes following tenotomy and correction of equinus, serious bleeding following tenotomy or any wound problems with percutaneous incision.

(Table 1)⁽⁷⁾ pirani severity score

MID FOOT SCORE				HIND FOOT SCORE			
Curved lateral border	0	0.5	1	Posterior crease	0	0.5	1
Medial crease	0	0.5	1	Rigid equines	0	0.5	1
Talar head coverage	0	0.5	1	Empty heel	0	0.5	1



Figure (1): Localization the head of talus



Figure: (2) Appearance of casts and foot

Group	Group A	Group B	Total number of patients
Corrected patients	24 patients 66.7%	3 patients 8.3%	27 patients 75%
Not corrected patients	5 patients 13.9%	4 patients 11.1%	9 patients 25%
Total	29 patients 80.6%	7 patients 19.4%	36 patients 100%

(Table 2): 9 weeks follow up result

Group	Group A	Group B	Total
Corrected	27 patients 75% 30 feet 68.2%	4 patients 11.1% 5 feet 11.4%	31 patients 86.1% 35 feet 79.5%
Not corrected (for surgery)	2 patients 5.6% 3 feet 6.8%	3 patient 8.3% 6 feet 13.6%	5 patients 13.9% 9 feet 20.4%
Total no. of patient	29 patients 80.5%	7 patients 15.9%	36 patients 100%
Total no. of feet	33 feet 75%	11 feet 25%	44 feet 100%

Table (3): 24weeks follow up results



Fig. 3 : Pattern of response to the treatment from the beginning to management

Discussion: The early results in our study demonstrates that with the use of the Ponseti method (88.9 %) of feet with idiopathic clubfoot can be corrected without the need for extensive corrective surgery. Our results is lower than the results of Dr. Ponseti series which was about 95% this is of course due to a degree of experience in the method as compared with Dr. Ponseti. In our series there were 4 patients of failure to response to repeated manipulation and casting in those undergo relapses . the main reasons for failure are partly because the application of counter pressure on the calcaneocuboid joint during the manipulation, by so doing, the normal movement of the calcaneus under the talus, a motion that is fundamental for the correction of the deformity, is prevented, because the 3 tarsal joints move simultaneously blocking the calcaneocuboid joint in turn prevents the movement of the talonavicular joint and therefore makes it impossible to correct the clubfoot ,and partly because patients compliance to splint which is very important pitfalls⁽⁹⁾.

The correction should be performed very gently to avoid these problem because crying and pain are associated with increased muscle tension in the lower extremity, making the manipulation and casting more difficult^(1,2,9). There were 10 children 27.8 % (12 feet 27.3%) of relapses after successful course of conservative treatment. Relapse is more severe when occurred and not respond to traditional Ponseti casting method in the patients whom treatment initiation was done after 8 weeks of the age.

The rate of relapses is really varied in various studies from (6-80%)^(6,7,9,15), this wide range is due to the degree of compliance of the family with the bracing protocol related to the economical and educational standard of these families, So splint compliance was compromised in all the relapsed cases. In 7 patients the Denis - Browne splint was used infrequently and it was never used in 3 patients.

An important finding in this study was the decreased number of patients who presented with a relapse after initial full correction We believe that this is attributable to the hyper abduction was obtained in the last cast and to the education of parents about the need to use the foot abduction brace at night and naptime until the age of 3-4 years. Our study has a number of important implications for parents, children, and physicians. From the public health standpoint, our findings can be used to reassure the public that the congenital idiopathic clubfoot deformity, although complex in nature, is easily corrected with high success rate in short period of time. We used a Pirani score as a method of clinical assessment of the amount of the deformity, we found that it is reliable and valid measurement; it document the amount of deformity and allows us to know where the baby is with respect to the progress of treatment, also it guides us to know when tenotomy is indicated and reassures the parents regarding progress. The outcome

of treatment according to Pirani scoring managed and separate those cases which needed limited or extended kind of surgery from those case resolved by casting only. Accordingly we were able to isolate four patients of scoring according to which we segregated our patient that made our road map of treatment clear a head. While traditional manipulation casting, and surgery may results in problems later life with allow success rate ranging from 10% to 50%^(9,16,17,18).

Follow up studies show patient treated with the Ponseti method have feet either no significant difference in function or performance compared to a population of a similar age born with normal feet with a success rate exceeding 95%. Other major difference between the Ponseti method and traditional casting is the length of time spent in cast. With traditional casting method, the patient will often need to endure a dozen or more casting sessions. Using the Ponseti method, however, a good correction is often obtained with 6-8 casting. The Ponseti method is effective in most cases of clubfoot. Even in those cases where a surgery who is familiar only with traditional casting deems the foot too stiff and requiring surgery. While follow up studies estimate that about one in ten children with clubfoot will require surgery^(1,2,6,13,19).

Conclusion

1. Good understanding the main pathology of club foot, and the ideal method of conservative methods of correction of the deformities systematically before starting the treatment.
2. In all types of club foot, we must start conservative treatment, either as a definite treatment or to make surgical treatment more easier for the surgeon and the patient. The period of casting may reach 7-8 weeks to get acceptable results.
3. Starting the treatment from the first week of life give excellent results and it will be decreased with delay.
4. In assessment of the patients, we must depend on clinical, radiological, and functional outcome.
5. Parental compliance is very important in the treatment of clubfoot.

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