

Original Article

CLINICAL AND RADIOLOGICAL ASSESSMENT OF THE EFFECTIVENESS OF
PONSETI TECHNIQUE IN TREATMENT OF CONGENITAL TALIPES
EQUINOVARUS

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Abstract

Congenital talipes equinovarus (clubfoot) is one of the most common congenital anomalies encountered in pediatric orthopedics. Its incidence is about 1:1000 live births. It remains a challenge not only to understand its genetic origins but also to provide effective long-term treatment and prevention of recurrences. Clubfoot can lead to serious walking problems if left untreated. Conservative treatment with the Ponseti method has revolutionized the clubfoot treatment and has been adopted globally in the last decades. Surgical treatment is indicated only after failure of conservative methods. Surgical release rate of the idiopathic clubfoot has decreased significantly since the emergence of the Ponseti method. The aim of this study was the evaluation of using ponseti technique for correction of cases of idiopathic CTEV deformity by clinical and radiological follow up aiming at determining benefits, drawbacks and obstacles to this technique. Between March 2020 and March 2021, total of 26 patients with 40 feet affected with congenital talipes equinovarus were treated using the Ponseti technique at the outpatient clinic of the orthopedics department of Sohag university hospital. Pirani scoring system was used for clinical evaluation of clubfeet. All patients had pre-treatment, post-correction and last follow-up plain radiographs that included antero-posterior (AP) and lateral dorsiflexion stress views of the feet. The antero-posterior and lateral talo-calcaneal angles (TCA) were measured and were used to calculate the talocalcaneal index (TCI). 16 patients (61.5%) were male, 10 (38.5%) patients were female. 14 patients (53.8%) had bilateral involvement, 12 patients (46.2) were unilateral. The age of patients at the time of presentation varied from one week to one and a half year with the mean age was 5 months. The mean number of the casts required was greater for the group that required tenotomy than the group that did not require tenotomy. Tenotomies were performed on 14 feet of 40 (35%) while 26 feet (65%) did not require tenotomy. The average initial Pirani score in this study was 5.0 range from (2-10) while the average final Pirani score ranged from (1 -1.5). Final results of correction according to Pirani score were excellent in 18 feet (45%), Fair in 20 feet (50%), and poor in 2 feet (5%). There was a statistically significant improvement in the mean values of the radiological parameters including TCA on AP and lateral views, and TCI after treatment when compared with the values at presentation. Ponseti technique of serial manipulation and cast is an easy, efficient, economical and reliable method of CTEV correction when it is applied early with 95% success rate.

Keyword: Congenital talipes equinovarus, Ponseti, Tenotomy, X-ray

1. Introduction

Congenital talipes equinovarus or clubfoot is one of the most common problems involving the musculoskeletal system, it is characterized by a complex three-dimen-

sional deformity of the foot. The individual deformities include four components; cavus of the mid foot, adduction of the forefoot on the midfoot, varus of the hindfoot and

equinus of the hindfoot. This deformity can be remembered by the mnemonic CAVE [1], tab. (1).

Table (1) Mnemonic for remembering CTEV deformities and order of correction

CAVE
1- Cavus
2- Adduction
3- Varus
4- Equinus

The first written description of clubfoot was given to us by Hippocrates (circa 400 B.C.). Clubfoot was first depicted in ancient Egyptian tomb paintings, and treatment was described in India as early as 1000 B.C. [2]. The incidence of congenital clubfoot is approximately 1:1000 live births every year. It may be unilateral or bilateral. Bilateral deformities occur in 50% of patients. Boys are affected twice as often as girls. About 80% of clubfoot cases occur in developing countries and most of these children are either left untreated or receive substandard care. Neglected clubfoot is one of the most frequent causes of physical disability worldwide [3,4]. CTEV may be primary (idiopathic) in 80% of cases or secondary (atypical or syndromic) in 20% of cases [5]. Idiopathic CTEV occurs as an isolated birth defect with no other malformations, its true etiology is still unknown, many theories have been suggested: intrauterine moulding, neuromuscular imbalance and delayed intrauterine development [6], mostly it is a multifactorial in etiology with interaction between polygenic inheritance and multiple extrinsic factors [7,8]. Atypical CTEV occurs in association with another congenital disease as distal arthrogryposis, congenital myotonic dystrophy, myelomeningocele, or other congenital diseases [5,9]. Deformity in idiopathic clubfoot is both cosmetic and functional with associated hypoplasia of skin, muscles, bones, tendons, ligaments and neurovascular bundle on the medial side and the affected foot is smaller than the normal foot [10]. Radiographs should be included as part of the evaluation of clubfoot, before, during, and after treatment.

In a non-ambulatory child, standard radiographs include antero-posterior and stress dorsiflexion lateral radiographs of both feet are used. Antero-posterior and lateral standing radiographs may be obtained for an older child. If the deformity is unilateral, the normal foot is used as a control to determine radiographic correction [11]. Many clinical classification systems have been used, including the systems of Pirani et al. and Diméglio et al. [12,13]. The Pirani scoring system is based solely on physical examination of different deformity components, it provides a total score that correlates with the severity of deformity. It requires no radiographic measurements or other special studies [12]. Treatment of clubfoot is controversial aiming to obtain a painless, plant grade, flexible, functional foot, with good mobility and tolerating normal footwear. Non-operative treatment is initially started regardless of the severity of the deformity. Various treatment regimens have been proposed, including the use of corrective splinting, taping, and casting [14]. Ponseti method developed by Dr. Ignácio Ponseti is widely recognized as the gold standard for the treatment of clubfoot, consisting of weekly serial manipulation and casting, in order to lengthen the contracted posteromedial structures and to restore the anatomical relationships between the bones until the foot is clinically and radiologically corrected. Finally percutaneous tenotomy of the Achilles tendon is almost required to correct the hindfoot equinus then a period of maintenance of correction with the use of a foot abduction orthosis to avoid relapse of deformities [15]. If conservative treatment fails, surgery may be required. The surgical procedures include; soft tissue releases, bony osteotomies or arthrodesis and gradual correction by Ilizarov. The aim of this study was the evaluation of using ponseti technique for correction of cases of idiopathic CTEV deformity by clinical and radiological follow up aiming at determining benefits, drawbacks and obstacles to this technique.

2. Patients and Methods

2.1. Patients

This prospective study has been done on cases of CTEV foot deformity seeking medical advice at the outpatient clinic of the department of orthopaedics surgery, Sohag university hospital. Between March 2020 and March 2021, a total 26 patients with 40 feet affected with CTEV, were treated using the Ponseti technique. The inclusion criteria were children, presenting with idiopathic clubfeet, unilateral or bilateral, with or without previous castings. The exclusion criteria were cases with acquired or atypical clubfeet. All cases had thorough clinical examination to exclude other associated congenital anomalies which were found in 4 cases and were excluded from the study; the first case had polydactyly of foot, the second had congenital inguinal hernia, the third had cleft lip and palate and the fourth had achondroplasia while the remaining included cases had no other associated congenital anomalies.

2.2. Methodology

2.2.1. Clinical assessment

1) Detailed history taking including; birth history, birth weight, age, sex, and family history of previous congenital anomalies. 2) General examination; searching for other congenital anomalies. 3) Musculoskeletal screening examination including; examination of the hips, the length of the legs and the circumference of the thigh and calves should be measured. 4) Neurological examination. 5) Examination of the foot for; side involved, the hindfoot (severity of the posterior crease, emptiness of the heel, and rigidity of the equinus) and the midfoot (curvature of the lateral border of the foot, severity of the medial crease, and position of the lateral part of the head of the talus).

2.2.2. Photographings

Photographs showing the deformity were taken pre-treatment, during correction, and post-correction and last follow up to

have an objective record against which the results were compared, figs. (1 & 2).



Figure (1) Pre-correction pictures of; **a.**, **b.** infant clubfeet with idiopathic CTEV, **c.** first cast with exaggeration of the deformity.



Figure (2) Post-correction pictures of; **a.**, **b.** infant clubfeet with idiopathic CTEV, **c.** foot abduction orthosis.

2.2.3. Clubfoot severity Pirani scoring system

It is based on hindfoot and midfoot deformities. It is composed of 10 different physical examination findings; each is scored according to the following principle: zero, if no abnormality, 0.5, in moderate abnormality, 1.0, in severe abnormality. A total score of 10 represents a severe clubfoot with a score of zero representing a normal foot. A corrected clubfoot deformity may still score 0.5–1 on the Pirani scale due to mild deformity of the hindfoot or skin creases, taking many years to score zero, tab. (2) [16]. The average initial Pirani score in this study was 5.0 range from (2-10) while the average final Pirani score ranged from (1 -1.5).

Table (2) Pirani classification of clubfoot

Physical examination findings	Score of 0	Score of 0.5	Score of 1
Curvature of lateral border of foot	Straight	Mild distal curve	Curve at calcaneocuboid joint
Severity of medial crease (foot in maximal correction)	Multiple fine creases	One or two deep creases	Deep creases change contour of arch
Severity of posterior crease (foot in maximal correction)	Multiple fine creases	One or two deep creases	Deep creases change contour of arch
Medial malleolar–navicular interval (foot in maximal correction)	Definite depression felt	Interval reduced	Interval not palpable
Palpation of lateral part of head of talus (forefoot fully abducted)	Navicular completely “reduces”; lateral talar head cannot be felt	Navicular partially “reduces”; lateral head less palpable	Navicular does not “reduce”; lateral talar head easily felt
Emptiness of heel (foot and ankle in maximal correction)	Tuberosity of calcaneus easily palpable	Tuberosity of calcaneus more difficult to palpate	Tuberosity of calcaneus not palpable
Fibula-Achilles interval (hip flexed, knee extended, foot and ankle maximally corrected)	Definite depression felt	Interval reduced	Interval not palpable
Rigidity of equinus (knee extended, ankle maximally corrected)	Normal ankle dorsiflexion	Ankle dorsiflexes beyond neutral, but not fully	Cannot dorsiflex ankle to neutral
Rigidity of adductus (forefoot is fully abducted)	Forefoot can be overcorrected into abduction	Forefoot can be corrected beyond neutral, but not fully	Forefoot cannot be corrected to neutral
Long flexor contracture (foot and ankle held in maximal correction)	MTP joints can be dorsiflexed to 90 degrees	MTP joints can be dorsiflexed beyond neutral but not fully	MTP joints cannot be dorsiflexed to neutral

2.2.4. Radiological evaluation

For all patients, pre-treatment, post-correction and last follow up plain radiographs were done that included antero-posterior (AP) and lateral stress dorsiflexion views of the feet. The antero-posterior AP and lateral talocalcaneal

angles (TCA) were measured. TCA is the angle between the longitudinal axes of the calcaneus and the talus. Both were used to calculate the talocalcaneal index (TCI) as the sum of TCA on AP and lateral views, fig. (3).

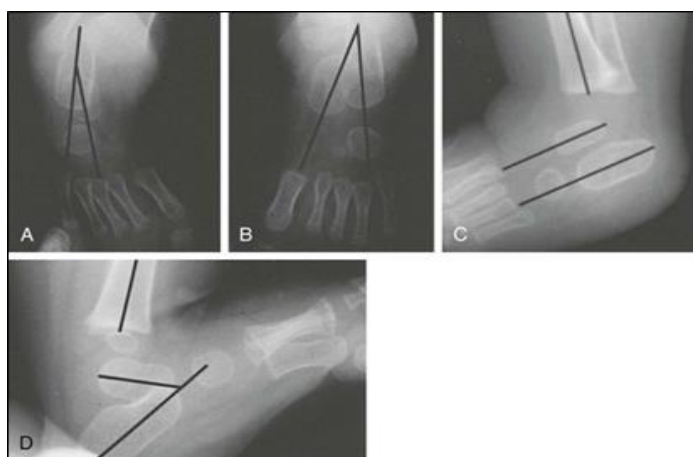


Figure (3) Radiographic evaluation of clubfoot; **a.** decreased TCA on AP view of clubfoot, **b.** TCA of normal foot, **c.** CTCA of zero on dorsiflexion lateral view of clubfoot, **d.** same angle in normal foot.

2.2.5. Treatment regimen

Treatment started as soon as possible after referral, preferably shortly after birth (within 7 to 10 days), as the skin

permits gentle manipulation. Treatment consists of gentle manipulation of the foot and the serial application of long leg plaster cast without the use of anesthesia,

as described by Dr. Ponseti. The corrective method was explained to parents. In all patients, the cavus is corrected first by supinating the forefoot and dorsiflexing the first metatarsal (lifting the first ray). This exaggerates the deformity but is an essential step to unlock the mid-foot. To correct the varus and adduction, the foot in supination is abducted while counter-pressure is applied with the thumb against the head of the talus. Because of the coupling between the hindfoot joints (subtalar, talo-navicular and calcaneonavicular) the abduction manoeuvre also led to correction of hindfoot varus. Four to eight long leg casts, changed weekly with new cast application after proper manipulation of the foot, (the manipulations performed lasted about 10 to 15 minutes), are usually sufficient to obtain good correction. In the last cast, the foot should be markedly abducted up to 70° without pronation with 15° of dorsiflexion without any forceful manipulation and a long leg cast is applied for three weeks. If dorsiflexion was not obtained up to 15° after achieving the abduction up to 70° and correction of the varus deformity, a simple percutaneous tenotomy of the Achilles tendon was performed. After final cast removal, for prevention of relapse deformity, a Foot Abduction Orthosis (FAO) with a Denis-Browne metal bar is worn full-time (23hr/day) up to 3 months then 12 hr/day till weight bearing age and finally at night till age of 4-6 years, fig. (2-c).

2.2.6. Follow up evaluation

Patients were assessed at one month intervals following complete correction of deformity. At each visit the foot was assessed for any loss of correction, limitation of ankle motion, empty heel sign and, curving of lateral border of foot. The earliest sign of relapse was the loss of ankle dorsiflexion. The splint fitting and compliance was recorded and any modifications required were discussed with the family.

2.2.6.1. Clinical evaluation of correction

The results were classified according to the Pirani score, as follows: excellent; if the total score was zero-1.0 point, fair; if the total score was 1.0-1.5 points, poor; if the total score exceeded 1.5 points.

2.2.6.2. Radiographic evaluation

With antero-posterior (AP) and lateral stress dorsiflexion views of the feet. The angles measured are AP and lateral talocalcaneal angles (TCA). Both were used to calculate the talocalcaneal index (TCI), fig. (4).



Figure (4) Pre-correction **a**, post-correction, **a**, x-rays of infant clubfeet.

2.2.7. Statistical analysis

Quantitative variables were expressed as means and standard deviation, while qualitative variables were expressed as percentages using SPSS Version 20 (IBM Corp, Armonk, NY). A *P* value < 0.05 was considered a statistically significant.

2.2.8. Ethical considerations

An informed written consents were obtained from parents of all participating patients. The study was approved by Scientific and Ethical committees of Sohag faculty of medicine.

3. Results

This prospective study included a total of 26 patients (40 feet) with congenital talipes equinovarus deformity. Patients were consecutive; 16 patients (61.5%) were males, 10 (38.5%) patients were females thus the male to female ratio is 1.6:1. Twenty patients (76.9%) presented before the age of 6 months at the beginning of the treatment and 6 patients (23.1%) presented after the age of 6 months. The mean age of patients at the time of presentation ranged from one week after birth to one and a half year. The

deformity was bilateral in 14 patients (53.8%) and unilateral in 12 patients (46.2%). The right side was affected in 22 feet (55%) and the left side was affected in 18 feet (45%). The total duration of the treatment from application of the cast to Denis-Browne splint is in between 6-8 weeks in 30 feet (75%) while in 10 feet (25%) it is in between 9-12 weeks, tab. (3). Tenotomies were performed on 14 feet of 40 (35%), while 26 feet (65%) did not require tenotomy as we achieved correction of the rigid equinus up to 15 degrees dorsiflexion when abduction was up to 70 degrees and no residual varus deformity. The mean number of the casts required was significantly greater for the group that required tenotomy which was 6 casts than the group that did not require tenotomy which was 4 casts. Following the removal of the final cast, no significant differences were found between those that had tenotomy and those that did not have tenotomy according to the Pirani severity score. It has been observed that if the treatment is started in the first 3 weeks of the life (16 patients), we could achieve 15 degrees of the dorsiflexion at the end of 4 casts and tenotomy was not required. Most of the midfoot deformity and hindfoot deformity lied in between moderate to severe according to Pirani Severity Score. We concluded that the abduction movement which we achieved was 70 degrees at the end of the cast application would gradually decrease as the age progress and become static between (21-30) degrees at the age of one year. In this series, we had excellent results when treatment was started at the age in between 0-6 months of 20 patients (76.9%). Parents of most patients accepted the look of the foot as it was normal or near normal at the end of casts. Final results of correction according to Pirani score was excellent in 18 feet (45%), fair in 20 feet (50%), and poor in 2 feet (5%), tab. (4). The mean TCA in AP and lateral views at presentation was 18.26° and 12.93°, and increased to 33.12° and

32.9° after correction, respectively. The mean talo-calcaneal index increased from 31.19° before correction to 66.02° after correction. There was a statistically significant improvement in the mean values of the radiological parameters after treatment when compared with the values at presentation as demonstrated in tab. (5), ($P < 0.05$). There is no significant loss of correction at last follow-up.

Table (3) Demographic distribution of the studied patients

Categories		No (%)
Total patients		26
Feet		40
Age at 1 st presentation	<6 months	20 (76.9%)
	>6 months	6 (23.1%)
Sex	Male	16 (61.5%)
	Female	10 (38.5%)
Diagnosis	Unilateral	12 (46.2%)
	Bilateral	14 (53.8%)
Side	Right	22 (55%)
	Left	18 (45%)
Total duration of treatment	6-8 weeks	30 feet (75%)
	9-12 weeks	10 feet (25%)

Table (4) Summary of tenotomy and Pirani score.

	Tenotomy group	No tenotomy group
No (%)	14 (35%)	26 (65%)
Average No. of cast required	6	4
Pirani score		
Initial Pirani score	Average	5.0
	Range	2-10
Final Pirani score	Range	1 -1.5
	Excellent	18 feet (45%)
	Fair	20 feet (50%)
	Poor	2 feet (5%)

Table (5) Radiological parameters at presentation and after correction.

	At presentation Mean±SD(Range)	Post-correction Mean±SD(Range)	Difference Mean±SD(Range)	P value
TCA (AP view)	18.26±7.42(5- 41)	33.12±6.5(26-50)	14.86±6.8 (3-28)	<0.001
TCA(lateral view)	12.93±9.81(0- 40)	32.9±5.59(25- 48)	19.97±8.42(0- 44)	<0.001
Talo-calcaneal index	31.19±12.88(12-66)	66.02±9.34(46- 97)	34.83±13.52(19-75)	<0.001

3.1. Compliance and relapses

For the purpose of this study, a relapse was defined as a club foot having a recurrent deformity that required further treatment. Four patients (6 feet) developed relapse; all the four patients were defaulters of Denis-Browne splint. Relapse was in the form of mild varus and mild equinus. Two corrective casts at weekly interval was required.

3.2. Complications

One cast was removed due to swelling, and one cast broken and needed to be changed early. No slipped casts. One patient had a week out of plaster due to a

pressure area over the head of the talus. In the event of redness we applied local antibiotics over the affected area.

4. Discussion

Congenital talipes equinovarus, or clubfoot, is one of the most common congenital musculoskeletal abnormalities, which affect the lower limb. Its incidence is about 1:1000 live births and up to 50% of cases are bilateral. It should always be recognized at birth but is now frequently diagnosed at 18 to 20 weeks of gestation by pre-natal maternal abdominal ultrasound examination [1,17]. It remains a challenge not only to understand its genetic origins but also to provide effective long-term treatment and prevention of recurrences. Clubfoot can lead to serious walking problems if left untreated as children walk on the sides and/or top of their feet, leading to callus formation, skin and bone infections, substantial limitation in mobility, and inability to wear standard shoes [18]. Diagnosis of clubfoot in the newborn is based solely on clinical findings. The intended role of radiography is to demonstrate the relationships between bones. Radiological correction of the deformity has no connection with the functional outcome of the results. Joseph, et al [19] measured talo-calcaneal angles on antero-posterior, stress dorsiflexion, and plantar flexion lateral radiographs of 75 normal feet and 145 clubfeet and found considerable overlap in the ranges of normal and clubfeet for all angles measured. In a mathematical model to predict the probability of clubfoot correction, a difference of 20 degrees between the lateral talo-calcaneal angles measured on the stress dorsiflexion and plantar flexion views indicated a 93% probability that the hindfoot deformity had been adequately corrected. The initial treatment of clubfoot is non-operative regardless of the severity of the deformity and start as soon as possible after birth. Various treatment regimens have been proposed, including the use of corrective splinting, taping, and

casting. The Ponseti method developed by Dr. Ignacio Ponseti is widely recognized as the gold standard for the treatment of clubfoot. It is based on abundant knowledge of the pathological anatomy and pathogenesis of clubfoot deformity [20]. It consists of weekly serial manipulation and casting, in order to lengthen the contracted posteromedial structures and restore the anatomical relationships between the bones until the foot is clinically and radiographically corrected. The order of correction is: first, correction of cavus by supinating the forefoot and dorsiflexing the first metatarsal (lifting the first ray), this exaggerates the deformity but it is an essential step to unlock the midfoot; next, correction of heel varus and forefoot adduction; the foot in supination is abducted while counter-pressure is applied with the thumb against the head of the talus which makes this method differ from that of the Kite where the lever fulcrum is at calcaneo-cuboid joint. Because of the coupling between the hindfoot joints (subtalar, talo-navicular and calcaneo-navicular) the abduction manoeuvre also led to correction of hindfoot varus; and finally, correction of hindfoot equinus. Correction should be pursued in this order so that a rocker-bottom deformity would be prevented by dorsiflexing the foot through the hindfoot rather than the midfoot. Four to eight long leg casts, changed weekly with new cast application after proper manipulation of the foot are usually sufficient to obtain good correction (the manipulations performed lasted about 10 to 15 minutes). In the last cast, the foot should be markedly abducted up to 70° without pronation with 15° of dorsiflexion without any forceful manipulation and a long leg cast is applied for three weeks. If dorsiflexion is not obtained up to 15° after achieving the abduction up to 70° and correction of the varus deformity, a simple percutaneous tenotomy of the Achilles tendon is performed [15]. The Ponseti method can be used for patients of all ages, with satisfactory outcomes.

Our results suggest that even patients presenting late with clubfeet can be treated successfully with the Ponseti non-operative technique which is also supported by Lourenco and Morcuende [21]. Problems can occur in any phase due to many causes: incorrect casting technique, improper tenotomy, under-corrected deformity, ill-fitting splints and poor compliance and all can affect successful outcomes. The severity of the deformity of our feet was graded according to Pirani scoring system, which is based on a 10 points scale of clinical signs of contracture relating to the hindfoot and midfoot. The Pirani score has been shown to have a good predictive value with regards to need for tenotomy and number of casts. We found this to be true in our study with the more severely deformed feet requiring a tenotomy and greater number of cast changes. Our wide range (2-10) of Pirani scores at presentation reflects there is large number of cases of CTEV. However, a median score of 5 also indicates a significant number of more severely deformed feet. Ponseti's method has excellent both short and long term outcomes, with the result that its practice is expanding worldwide. Although our study is small, with short follow up, the early results (success rate of 95%) are encouraging and compare favourably with those achieved by other centers. We required on average approximately 6 cast changes to correct the more severely affected feet. This is equal to the more experienced centers [20]. Successful correction of clubfoot deformity generally is reported in 90% to 98% of children treated with Ponseti non-operative method. Bor, et al. [20], Goksan, et al. [22], and Morcuende, et al. [21] reported that Ponseti casting can be used in children 2 years old, even after previous unsuccessful non-operative treatment. Several radiological parameters have been described in the literature to define the anatomical abnormalities associated with clubfeet. We used the AP and lateral

TCA as well as the TCI for the radiological assessment of the feet. These are the most widely used and accepted parameters, as they reflect the anatomical relationship between the talus and the calcaneus [23,24]. The normal radiographic measurements of paediatric feet were reported as follows: TCA (AP view) 30°–55°, TCA (lateral view) 25°–50°, TCI < 40°. Compared to our results, ranges of angular measurements of clubfeet and healthy feet are overlapping. Our results agree with the published results of Brand, et al. [25] and those published in 1981 by Ponseti, et al. [24]. Percutaneous Achilles tenotomy was performed for 14 feet of 40 (35%) which is lower than other studies as percutaneous Achilles tenotomy was required in 85 (85%) of 100 feet reported by Changulani, et al. [26], in 35 (97%) of 36 feet in the series of Bor et al., in 90 (67%) of 134 feet described by Goksan, et al. [22], in 200 (91%) of 219 feet treated by Dobbs et al., and in 36 (72%) of 50 feet reported by Scher, et al. [27]. In a study to predict the need for tenotomy, Scher, et al. found that patients with a Pirani score of 5, or grade VI, by the system of Diméglio, et al. [13] are very likely to require tenotomy. At the end of cast treatment, however, there was no significant difference between patients with and without tenotomy. Dobbs, et al. [28] reported bleeding complications after percutaneous tenotomy in four children—three presumed to be caused by injury to the peroneal artery and one by injury to the lesser saphenous vein. These authors recommended making a small open incision directly over the tendon before severing it, making the tenotomy from medial to lateral, and using a more rounded (beaver-eye) blade to avoid vascular injury. Our patients had much better ankle range of motion, both in dorsiflexion and planter flexion. Regardless of the method of treatment, CTEV has a tendency to relapse. The primary risk factor for recurrence after correction is related to poor or non-compliance with bracing and these recur-

rences may require more extensive surgery than Achilles tenotomy. By providing a personalised closer contact service, we feel better continuity of care, education and empowerment of parents, and therefore compliance, can be ensured. This is particularly important in such a prolonged management protocol. Our results are still early, and later recurrences and relapses may still occur.

5. Conclusion

Clubfoot is the commonest musculoskeletal congenital condition in our hospital and can be effectively treated using Ponseti technique. The outcome is better the earlier it is started. Ponseti technique is an easy, effective and economical method of CTEV correction when it is applied in idiopathic clubfoot. With ponseti technique there was a statistically significant improvement in the mean values of the radiological parameters including TCA on AP and lateral views, and TCI when compared with the values at presentation. The obstacles to ponseti technique are; the parent's non-compliance of bracing protocol of their kids and the parent's negligence of the serial cast exchange and cast care.

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