

Ten-year clinical experience of Ponseti method in the treatment of idiopathic clubfoot

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ABSTRACT

Idiopathic clubfoot is the most common congenital deformity of the musculoskeletal system. Apart from the idiopathic form of the disease, this characteristic deformity has also been observed in the clinical picture of some syndromes, neuromuscular diseases or arthrogryposis multiplex congenita. Its etiology is not fully known, and there is disagreement among researchers about its treatment. The purpose of this study is to review the patients with idiopathic clubfoot treated with the Ponseti method between 2007-2016, with particular emphasis on the minimal cases that method failed and the literature data. In our department, 187 feet were treated in 123 infants (89 males and 34 females) aged 22 days (ranging from 5 days to 5 months). Ponseti's instructions have been precisely applied both during the manipulation exercises and the application of the plaster casts as well as during the implementation of Denis Browne brace. Achilles tenotomy was required in all unilateral cases (59 feet) and 49 cases of bilateral deformity (98 feet). In order to evaluate the severity of the disease and the improvement of the deformity during treatment, we used the Dimeglio scoring system. Radiological tests were required in very few cases after 6 months, in order to confirm the clinical outcome. In a follow-up of 12 months to 7 years, we had very good results. There was a great improvement of the deformity, with a full range of motion, without foot pain, calluses, hyperkeratoses or any difficulty in footwear. Patients were very satisfied with treatment results and able to participate in sports activities. In 7 cases a repeat of the procedure was required, while 4 cases of relapse were surgically treated with limited postero-lateral soft tissue release. Two girls presented a leg length discrepancy of 2-3 centimeters. One of them was treated with shoe modification, while the other was subjected to a temporary epiphysiodesis of the longer leg at the age of 10 years. We believe that the complete understanding of the pathogenesis of the disease, the excellent collaboration with parents and the correct application of the Ponseti's method, make it beneficial in any case of severe idiopathic clubfoot, when we want to avoid relapse of the deformity.

KEY WORDS: idiopathic clubfoot, Ponseti method, experience

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Introduction

Idiopathic clubfoot is the most common congenital deformity of the musculoskeletal system. In the literature, its incidence rates vary widely. There are 1-2 cases per 1,000 births of healthy infants [1]. Famous men of History and Art suffered from the disease, such as the Roman Emperor Claudius, Lord Byron, and Walter Scott [2]. The disease has been known since ancient times. Hephaestus, the deformed son of goddess Hera, was thrown into the sea by his own mother, but sea-goddess Thetis saved him from drowning [3]. “*Αμφιγυήεις*” (with both limbs crooked) and “*κωλοποδίων*” (bowlegged) are the adjectives Homer uses for him (Fig. 1).

Several theories that have been proposed at times, unsuccessfully attempted to justify the true nature of the disease. The variety of different opinions proves the researchers’ inability to agree. Theories consider as the main reason sometimes the developmental factor, in myogenic and/or neurogenic causes [4-7] and sometimes a blastic deficit in the endochondral growth of the talus [8]. In some cases there was a congenital disorder in the development of the dorsal artery of the foot and the posterior tibial artery [9-11], while in other cases it was clear that there was a responsible gene, despite the researchers’ inability to detect a specific gene deficit [12,13]. There are published studies that report the coexistence of clubfoot and other congenital abnormalities [14], such as the spina bifida occulta in a monozygotic neonatal twin [15]. The research in order to find the cause of the disease continues until nowadays, as it is a real challenge for the clinical doctor. In a relatively recent study, there was no association of the deformity with the application of opioids during pregnancy [16]. It appears that the characteristic deformation probably represents the effect of the interaction of many factors on a genetically sensitive foot (Fig. 2).

In the idiopathic clubfeet, neck of the talus is shorter than normal and shifts inwards by drifting the navicular bone. The articular surfaces of the subtalar joint are malformed, forcing the calcaneus to take a wrong and dysfunctional position. The cuboid bone is displaced inwards with respect to the deformed calcaneus [17]. It is very impressive that current science opinion



Fig. 1: A black-figure vase of the geometric period, depicting god Hephaestus riding horseback, with a characteristic clubfoot deformity on the right lower limb.

about the deformity does not deviate from Antonio Scarpa’s initial formulation a few centuries ago: “The deformation is caused by the twisting of the navicular bone, the calcaneus and the cuboid bone around the talus” [18].

The treatment of the disease has taken various forms from time to time, following a variety of practices. The goals from ancient times to nowadays remain the same: 1) long-term correction of the deformity, 2) painless and functional foot, 3) avoiding surgery, 4) where surgery is needed, it is appropriate to limit the *à la carte* handling [19]. Hippocrates was perhaps the first one that tried to teach ways of correcting the deformation. During the Middle Ages, barber-surgeons, impostors and charlatans took over the baton [20]. After the Renaissance and during the 19th century, Achilles’ tenotomy was popular, but did not solve the problem overall [21]. Nowadays, the techniques have



Fig. 2: The clinical picture of the congenital idiopathic clubfoot is consisted of several partial deformities: equinus, cavus, supination, varus, forefoot adduction, and foot rotation relative to the tibia.

been significantly improved and are based on the belief that in order to avoid relapses, it is required by the physician to precisely understand the pathogenesis of the disease [22].

The basic conditions for the success of any treatment method are those supported by Tachdjian [1] and almost all writers agree [2,19,23]: "Treatment onset should be as early as possible and at the beginning should be conservative". Here, it is important to highlight the value of early diagnosis from the prenatal period with the help of fetal ultrasound tests, which are reliable from the 18th to the 24th week of pregnancy [24]. In case that conservative treatment is ineffective, surgical correction must be performed before the age of 12 months [25]. Turco suggested that surgery should be performed over the age of one year, on the basis that only in this period the tissues are recogniz-

able, surgical times are easier, anesthesia risks are less, and the possibility of damaging articular cartilage and epiphyses from mismanagement is limited [26].

Previous policy, based on successive plaster casts every 7-10 days for 3 to 4 months, according to Kite's principles, belongs in the past [27]. Later, was found out that all the attempts of immobilization of the foot in pronation within the plaster, without previous correction the varus deformity of the calcaneus, caused the opposite effects of the desired [28,29]. Currently, the most effective methods of conservative treatment are French (functional) and Ponseti's method. French method requires enough time in each session, skill and good cooperation with parents. Practice, progress, and course evaluation are left to the physiotherapist's art, while the treating physician plays a secondary role [30].

Although the first publications by Ignacio Ponseti himself date back to the distant 1948, our department began to apply his method exclusively from 2007 and after. According to Ponseti's recommendations, successive plaster casts are applied weekly for the first 2 months. Each time that the plaster cast is changed, special exercises are performed, in order to contribute to a progressive improvement and correction of the varus deformity of calcaneus, the supination and adduction of the forefoot, while the equinus deformity is corrected after 2 months, when a closed transdermal tenotomy of Achilles tendon is performed under general (or local) anesthesia [25,31,32]. A plaster cast is placed additionally for one month and then is replaced with a Denis Browne corrective brace, which is placed for the first 3 months during the whole day and for the remaining 6 months only at night until start of walking. Ponseti's method fans support continued treatment until the age of 3 years. In Greece, as in other countries, French (functional) method did not find supporters [33].

Despite the fact that criticism has been made about the principles of application of the method, they were finally prevailed over time. Nowadays Ponseti's method is used in both the developed and the developing world [34-38]. The advantages of this method are more often studied, compared to other methods or surgical treatment, because it has been proven that



Fig. 3: After the Ponseti's method distention manipulations for the correction of the deformities (except for equinus deformity), a plaster of Paris or a synthetic resin cast is applied.



Fig. 4: A Denis Browne brace in a toddler with a bilateral clubfoot.

Ponseti's method results in a more functional, flexible and painless foot [39-41]. Even at older age, its application was successful [42,43], while it has also been tested in non-idiopathic forms of the disease, where previous methods were ineffective [44].

The reasons for Ponseti's method failure are related to delayed treatment initiation, mismanagement, various social and economic reasons, or the lack of knowledge [2,45,46]. Ponseti himself pointed out the mistakes of Kite's technique, paying great attention to avoiding them [29,31]. Many problems arise with the involvement of parents in the process. When a Denis Browne brace is applied, problems are multiplied [36]. Infants do not always tolerate it and sometimes they find out how to get rid of it, while the parents find it difficult to apply it correctly.

In this study we describe our 10-year experience of Ponseti's method application for the treatment of idiopathic clubfoot, with emphasis on a minimal number of cases that the method failed and the literature data.

Material-Methods

From January 2007 to December 2016, we hospitalized in our department 123 infants (187 feet) with idiopathic clubfoot, which was diagnosed prenatally by fetal ultrasound test, or immediately after birth by the clinical examination. These were 89 males (72.3%) and 34

females (27.7%). The mean age for starting the treatment was 22 days (range from 5 days to 5 months). In 59 cases the deformation was unilateral (35 right feet, 24 left) and in the remaining 64 cases bilateral. Patients who were suffering from non-idiopathic clubfoot were excluded from the study.

In order to perform the exercises correctly in every plaster cast change, we strictly followed Ponseti's instructions. We used plaster of Paris in 68 patients (55.28%) and synthetic resin for the rest (**Fig. 3**). We preferred general anesthesia in older infants, particularly in early cast changes, in our attempt to control hyperactivity and their expected reactions. It took about 5 to 7 cast changes (average 6.3 changes) before the Achilles tenotomy. Tenotomy was required in all unilateral cases (59 feet) and in 49 cases of bilateral deformation (98 feet). With the exception of very few patients during the first application of the method, where we preferred local anesthesia, the majority of cases were subjected to general anesthesia.

After tenotomy, casts were applied again for 1-2 more times (for 3-4 weeks). Then a Denis Browne type brace was applied, whose bar was adjusted so that its length was equal to the distance length between the shoulders. The deformed foot was immobilized at 65° of external rotation, while the normal foot at 45° of external rotation (**Fig. 4**). By giving instructions to the



Fig. 5: Radiological markers: Measurement of the angle between the longitudinal axis of talus and the longitudinal axis of calcaneus, in both the anteroposterior (a) and the lateral view (b). The angle between the talus and the 1st metatarsal in the anteroposterior view is also measured, as well as the calcaneus position in the lateral view.

parents, we were trying to inform them about the way that the brace could be removed and re-applied, while trying to reassure them by providing them psychological support.

In order to assess the severity of the disease and the improvement of the deformity during or after treatment, we have used the Dimeglio scoring system, which is based on clinical criteria only and has been proven to be extremely reliable and easy to be applied. According to this, each component of the deformity (equinus deformity, varus deformity of the calcaneus, rotation of the foot in relation to the tibia, adduction of the forefoot) is estimated from 1 to 4, depending on the severity [47,48]. More points are added when skin creases, foot shortening and/or gastrocnemius atrophy, coexist. The final estimation of the severity of the disease is calculated by the sum of scoring points. Benign form scores <5 points, moderate severity form scores 5-9 points, severe form scores 10-14 points and very severe deformity scores 15-20 points.

Roentgenograms were not used in the initial assessment of the disease, except in very few cases after the

first 6 months. The angle between the longitudinal axis of the talus and the longitudinal axis of the calcaneus, was measured both in the anteroposterior and lateral views. The angle between talus and 1st metatarsal in the anteroposterior view was also measured. Finally, the calcaneus position in the lateral view was estimated (Fig. 5). Normal values of radiological measurements vary widely. In the anteroposterior view, the talocalcaneal angle ranges from 30 to 55 degrees. The angle of talus-1st metatarsal ranges from 5 to 15 degrees. In the lateral view, the talocalcaneal angle ranges from 25 to 50 degrees [49].

During the Denis Browne brace application, patients were regularly monitored on outpatient basis, every three months initially and every 6 months thereafter. Clinical examination included assessment of range of motion of individual foot joints (tibiotalar, subtalar, Chopart joint), shoe wear control, skin observation and the Chesnut test (block test) in order to determine the persistence of varus deformity of the calcaneus (Fig. 6). Roentgenograms were not necessary in most cases. The follow-up lasted 4.6 years



Fig. 6: In Chesnut (block) test, the foot is loaded on its outer margin, while standing over a book in an eccentric position. We can notice the degree of valgus deformation of the calcaneus.

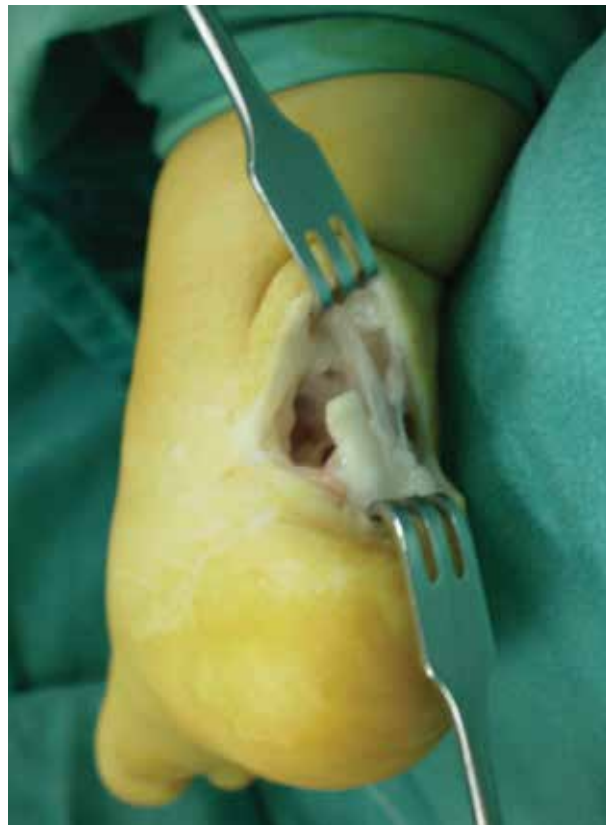


Fig. 7: Limited posterolateral soft tissue release, in cases of relapse of the deformity, in the event of failure of the Ponseti's method.

(ranging from 12 months to 7 years) and continues to date.

Results

According to the Dimeglio scoring system, during the initial assessment, 97 feet (51.8%) had severe deformity (score: 12-14 points), while in the remaining 90 feet (48.2%) the deformity was very severe (score: ≥ 15 points). After the end of the treatment there was a clear improvement. All bilateral cases were assessed with 5 points score, while the unilateral cases with 7 points score. The results were considered satisfactory when the infant had painless feet, without calluses and/or hyperkeratoses, while could easily wear shoes and participate in athletic activities, without any complaints or any other problems, with a range of motion of the individual foot joints within the normal limits.

The duration of Denis Browne brace application was 15 months (range 12-36 months). Ponseti's method had to be repeated in 7 cases. There were 4 relapses for which surgery was required. We preferred to perform a limited posterolateral soft tissue release, with posterior capsulotomies of the tibiotalar and talocalcaneal joints, along with division of the fibulocalcaneal ligament and open Achilles tendon lengthening (**Figure 7**). The final result in these cases, according to the Dimeglio scoring system and the Chesnut test, was considered satisfactory.

Two girls of the four patients in which soft tissue release was performed, presented leg length discrepancy. One of them presented a length discrepancy of 2 cm and a shoe modification has been done, by adding an outer sole to the shoe of the shorter leg. The other girl presented a leg length discrepancy of 3 centime-

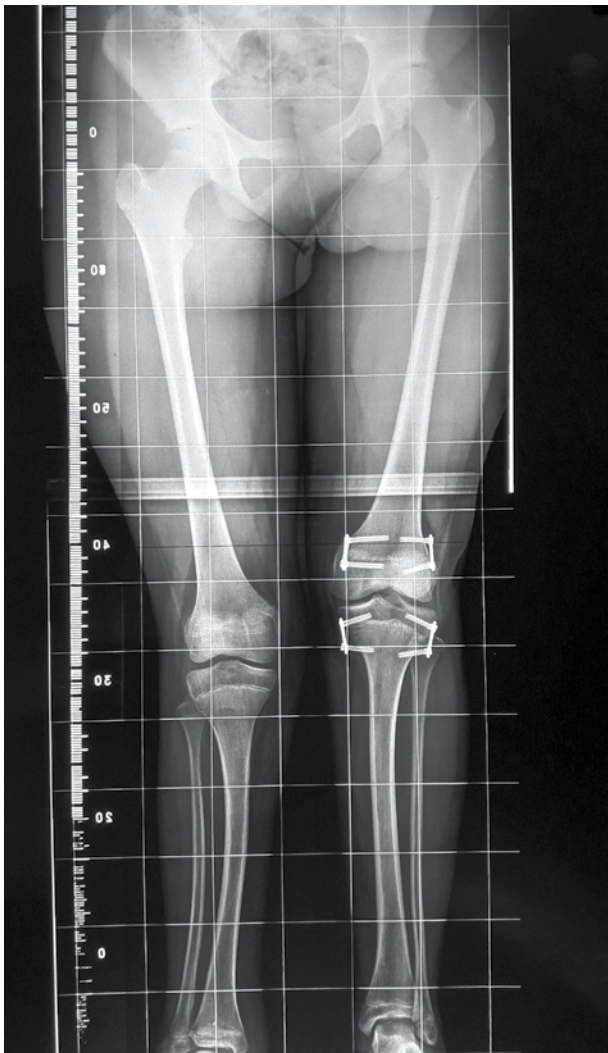


Fig. 8: A 10-years-old girl, with a right clubfoot deformity and leg length discrepancy of 3cm. A temporary epiphysiodesis was attempted on the left longer leg.

ters and a temporary epiphysiodesis was performed to her longer leg at the age of 10 (**Fig. 8**). In small number of cases, where we used x-rays to confirm the clinical outcome, the radiological markers were within the normal range, but the size of the talus was estimated to be shorter than normal (**Fig. 9**).

Discussion

The results of the application of Ponseti's method, which was for the first time applied in our department to 123 patients that are included in this study,



Fig. 9: After the end of the treatment, X-rays can show the shorter than normal size of the talus.

responded to our concerns, as they were formulated in a previous published paper [2]. Surgical treatment, which was previously preferred as the most appropriate solution to rigid deformities that resist to the conservative treatment, resulted in correcting all the anatomical structures that are responsible for the deformity, without exception. According to the principles of Turco [26], in a single operation, with the posteromedial release of the responsible soft tissues, we attempted to achieve perfect anatomical reconstruction of the foot. The whole procedure involved extensive release of ligaments, complete release of the subtalar joint, release of the tendon sheaths, tendons lengthening (tibialis posterior and digitorum flexors), capsulotomies of talonavicular and naviculocuneiform joints and open lengthening of Achilles tendon (**Fig. 10**). The reduction of the navicular bone at the head of the deformed talus was achieved by the insertion of a Kirschner wire, which was removed after 6 weeks.

Many surgeons, after Turco, have attempted various modifications to his technique. Carrol [50] suggested, in addition to other manipulations, division of the plantar aponeurosis and capsulotomy of the calcaneocuboid joint. Goldner was not interested in the perfect release of the subtalar joint [51]. Simons [52] applied the Cincinnati posterior approach and the release of most of the anatomical structures surrounding the talus. Talonavicular and calcaneocuboid joints were opened, while in the opening of the subtalar joint the interosseous ligament was intersected.

In these interventions, there is no room for failure. During the first operation, surgeon has a unique op-



Fig. 10: During the posteromedial soft tissue release (according to Turco), we perform broad ligament releases, capsulotomies, tendon sheath divisions and lengthening of tendons.

portunity to correct all the deformity components. Surgical times do not apply a specific algorithm. Orthopedists are not helped by the understanding of standard techniques, nor the knowledge of bibliographical references. The surgeon, step-by-step, releases stiff periarticular tissue à la carte, according to the findings during surgery. The most common causes of relapse are incomplete first surgery and mismanagement. Multiple operations should be avoided, because they result to stiffness, scarring, soft tissue hardening, and muscle atrophy due to prolonged immobilization [2].

Following the Ponseti's method over the last decade, we have tried to avoid all these difficulties. The results justified our expectations. Besides, the existing literature supports the advantages of the method in a number of parameters [53-60]. This method has significantly reduced the cases that need to be operated on and has been established in the major clinical centers abroad as the most effective solution to idiopathic clubfoot. It is based on the full awareness of the pathogenesis of the initial deformity. Its excellent results are highlighted not only by clinical and radiological criteria but also by means of CT. It has been successfully applied to older than 2-year-old infants with neglected deformities. Late satisfactory results are considered to

be equivalent to the early excellent results in the first months of application of the method. Recent meta-analyses proved that this technique is superior to all the other treatment practices which have been used occasionally. Finally, Ponseti's method is more economical than other methods. It is obvious that nowadays, where there are tremendous financial problems and a large number of uninsured patients, a low-cost technique like this seems to be attractive.

During the manipulations between the successive plaster cast changes, before Achilles tenotomy, we faithfully followed the instructions given in the literature, although sometimes we could not resist the temptation to exert a slight thrust on the heel. However, we have resisted some challenges, such as the placement of a below knee splint (instead of above knee one) [61], the use of a 19-gauge needle (instead of a scalpel) for the tenotomy [62], or the botulinum A toxin infusion, because it has not been actually shown to speed up the correction of the deformity, or to reduce the need of tenotomy and the frequency of relapses [63].

We did not dare to use the Ponseti's method in non-idiopathic forms of the disease, especially in arthrogyriposis, despite the encouraging studies of other researchers [44,64]. We also did not use physiotherapy [65], fully assuming the responsibilities and consequences of our practice, for the same reason that we do not support the application of the French (functional) method. The role of the Orthopedic Surgeon in the treatment of idiopathic congenital clubfoot should be prominent.

Assessing the severity of the deformity is required in any case to set the therapeutic plan. It is also useful for determining the prognosis of any therapeutic action. We cannot compare the early and final results of different treatment methods if we have not previously assessed the initial severity of the disease. Various scoring systems, all based on clinical criteria, have been applied for this purpose [47,48,66,67]. Among the two most popular systems of Pirani and Dimeglio, we preferred the latter because of the familiarity with it. Moreover, it does not seem to outweigh each other [68], although there has been a disagreement over the criteria in several publications [69].

For the estimation of deformity we preferred clinical criteria instead of radiological. We looked at the X-rays only in very few cases, after 6 months, when we wanted to confirm the results of the method using objective criteria. At younger ages, most skeletal structures of the foot are cartilaginous, the bones appear very small, the osseous nuclei are in an eccentric position and their radiographic imaging is difficult. After the 6th month, we can estimate the various radiological markers, the calcaneus position and the size of the talus, but we cannot see any existing bone deformities [70]. At older ages, radiological testing can also confirm the treatment-related development of talus and calcaneus [71], as it has been shown that they have greatly restored their blood flow in most of the cases that were successfully treated with the Ponseti's method [10]. Lately, ultrasound test is getting more and more popular in the diagnostic approach and monitoring of the disease, as it is a non-invasive and non-ionizing technique, which is superior to the others in the presentation of cartilaginous anatomical structures [72]. On the contrary, CT scan is not indicated, because of the increased emission of ionizing radiation [54].

The reasons for Ponseti's method failure, as mentioned before, are related to a delay in treatment initiation, mismanagement, a variety of social and economic reasons, or the lack of knowledge. However, unpredictable factors may also lead to failure, such as tibial and/or fibular fractures during plaster cast application [73]. Gastrocnemius atrophy cannot be considered a reliable indicator of method failure, as it relates to the pathogenesis of the disease and remains until adulthood, despite any attempts to improve it [7]. Strengthening of the peroneal muscles in order to prevent relapses, perhaps may be useful if parents are properly informed and comply with the guidelines [74]. The efficacy of the tenotomy is questionable, given the Achilles tendon ability to be fully restored, not within 3-4 weeks when we remove the plaster casts, but at 12 weeks, as ultrasound tests showed in an experimental prospective study from Spain [75].

We believe that, in most cases of the method's failure, the main cause is the parents' inability to disci-

pline at the stage of application of the Denis Browne brace. The truth is that when patients tolerate the brace, fewer relapses occur and the need of surgical treatment is rare [76]. Patients who have tolerated the brace for more than 2 years, were 2.7 times less likely to return to the operation hall than those who have not [77]. The use of new types of braces, in place of the traditional Denis Browne, promises comfortable application, tolerance and efficiency [78-80]. Relapses that occurred at ages under 2 years, were not related to the type of the brace [81]. The only reason that Denis Browne brace may be "accused", is the appearance of pes planovalgus deformity of the other foot, in unilateral forms of the disease [82].

In 7 cases where the method was repeated, it was about infants younger than one year old. In cases of relapse at older ages, we preferred limited soft tissue release (4 cases). Indications for surgical intervention in cases of relapses, as well as the type of manipulations for the correction of the deformity, have not yet been specified [83,84], but we know that in relapses following method's failure there are three internationally accepted solutions: 1) repetition of the method, 2) complete soft tissue release à la carte and 3) placement of an Ilizarov device [85]. We have no experience about Ilizarov's technique in the treatment of idiopathic clubfoot, but we know that when is combined with limited soft tissue release, it can give excellent results [86].

Recently, once again, have been formulated the clinical criteria on the basis of which we can clearly support that we have excellent results [87,88]: 1) feet without deformities, 2) possibility of using normal footwear without special modifications, 3) absence of pain or other disturbances, 4) satisfied parents. From this perspective, we think the results of our choices have justified our expectations.

Conclusions

All the attempts for the treatment of idiopathic clubfoot focus on either the distension of stiff soft tissue with manipulations, the correction of the deformity and the maintenance of the corrected foot position, or the surgical repair of deformities that do not respond to conservative treatment. The onset of treatment should be

as early as possible. A complete understanding of the pathogenesis of the disease, close collaboration with parents, and correct application of the Ponseti's method, can make it useful in any case of severe idiopathic

clubfoot, when we want to avoid relapses. 

Conflict of interest:

The authors declared no conflicts of interest.

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Markeas NG, Begkas D, Apergis C, Kondylis A, Theodoridis K. Ten-year clinical experience of Ponseti method in the treatment of idiopathic clubfoot. *Acta Orthop Trauma Hell* 2018; 69(2): 72-84.

ΠΕΡΙΛΗΨΗ

Η ραιβοϋποποδία είναι η συχνότερη συγγενής παραμόρφωση του μυοσκελετικού συστήματος. Εκτός από την ιδιοπαθή μορφή της νόσου, η χαρακτηριστική παραμόρφωση έχει παρατηρηθεί επίσης στο πλαίσιο της κλινικής εκδήλωσης κάποιων συνδρόμων, νευρομυϊκής νόσου ή αρθρογρύνωσης. Η αιτιολογία της δεν έχει ακόμη πλήρως αποσαφηνιστεί ενώ η αντιμετώπιση της αποτελεί σημείο αντιλεγόμενο μεταξύ των ερευνητών. Σκοπός της μελέτης μας ήταν η ανασκόπηση των ασθενών με ιδιοπαθή ραιβοϋποποδία που αντιμετωπίσαμε με τη μέθοδο Ponseti στη δεκαετία 2007-2016, δίνοντας ιδιαίτερη έμφαση στις ελάχιστες περιπτώσεις αποτυχίας της μεθόδου, καθώς και στα δεδομένα της βιβλιογραφίας. Στην κλινική μας αντιμετώπιση ήταν 187 πόδια σε 123 βρέφη (89 αρρένα και 34 θήλεα), ηλικίας 22 ημερών (εύρος από 5 ημέρες έως 5 μήνες). Ακολουθήσαμε πιστά τις οδηγίες του Ponseti, τόσο κατά τη διενέργεια των ασκήσεων και τις εφαρμογές των ναρθικών όσο και στη διάρκεια εφαρμογής του κηδεμόνα Denis Browne. Τενοντοτομή του Αχιλλείου απαιτήθηκε σε όλες τις ετερόπλευρες περιπτώσεις (59 πόδια) και σε 49 περιπτώσεις αμφοτερόπλευρης παραμόρφωσης (98 πόδια). Για την αξιολόγηση της βαρύτητας της νόσου και την εκτίμηση της βελτίωσης της παραμόρφωσης στη διάρκεια της θεραπείας, χρησιμοποιήσαμε το σύστημα αξιολόγησης του Dimeglio. Ο ακτινολογικός έλεγχος απαιτήθηκε σε ελάχιστες περιπτώσεις μετά τους 6 μήνες για την επιβεβαίωση του κλινικού αποτελέσματος. Σε ένα follow-up που κομάνθηκε από 12 μήνες έως 7 έτη, είχαμε ικανοποιητικά αποτελέσματα. Η παραμόρφωση παρουσίαζε σαφή βελτίωση, τα πόδια εμφανίζονταν ανώδυνα με πλήρες εύρος κίνησης, δίχως κάλους, υπερκερατώσεις ή δυσκολίες στην υπόδηση. Οι ασθενείς δεν παραπονούνταν για ενοχλήσεις και συμμετείχαν απρόσκοπτα σε αθλητικές δραστηριότητες. Χρειάστηκε να επαναλάβουμε τη μέθοδο σε 7 περιπτώσεις, ενώ αντιμετωπίσαμε χειρουργικά 4 υποτροπές με περιορισμένη οπίσθια-εξωτερική απελευθέρωση μαλακών μορίων. Δύο κορίτσια εμφάνισαν ανισοσκελία της τάξεως των 2-3 εκατοστών. Το ένα αντιμετωπίστηκε με τροποποίηση των υποδημάτων ενώ το άλλο υποβλήθηκε σε προσωρινή επιφυσιόδεση του μακρύτερου σκέλους σε ηλικία 10 ετών. Πιστεύουμε ότι η πλήρης κατανόηση της παθογένειας της νόσου, η άψογη συνεργασία με τους γονείς και η πιστή εφαρμογή της μεθόδου Ponseti, την καθιστούν ωφέλιμη σε κάθε περίπτωση σοβαρής ιδιοπαθούς ραιβοϋποποδίας, όταν επιθυμούμε να αποφύγουμε τις υποτροπές.

ΛΕΞΕΙΣ ΚΛΕΙΔΙΑ: ιδιοπαθής ραιβοϋποποδία, μέθοδος Ponseti, εμπειρία