

## Results of the Conservative Treatment in Clubfoot using the French Method

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### Abstract

The idiopathic clubfoot represents a congenital deformation incorporating four distinct alterations: the equinus, varus, cavus and adduction of the forefoot to the hindfoot. The meaning given to the conservative treatment of clubfoot by French method is that of mobilization-manipulation and serial plaster immobilizations. We followed the results of the early conservative orthopedic treatment in the congenital clubfoot in 52 patients (74 feet) under the age of 1 year. These cases were treated in the Department of Pediatric Orthopedics of the Rehabilitation Clinical Hospital of Cluj-Napoca for a period of 5 years. The degree of deformation used DiMeglio's clinical criteria. The conservative treatment began since the presentation of the cases with mobilizations – manipulations and continued up to the age of one month. After the age of one month, serial plaster immobilizations followed. When the conservative treatment failed consecutive to five or six successive plasters, the correction already obtained was followed by surgery. The percentage of the favorable results after the conservative treatment can reach 82.44%. The results are not so good in cases of arthrogyposis multiplex congenita, myelomeningocele etc.

**Keywords:** Clubfoot; Conservative treatment; French method.

### Introduction

The treatment of congenital clubfoot continues to be controversial [1-4]. The aim of such treatment has been to obtain a straight, painless, plantigrade and mobile foot with a normal radiographic appearance. In the past great emphasis was placed on operative than on manipulative techniques [1-2].

Nonoperative management of idiopathic clubfoot has seen a considerable resurgence of interest in Europe and North America since the mid-1990s [5]. Before then, surgical management, often involving extensive soft tissue releases, was considered the treatment of choice due the perception that non operative treatment (serial casting) rarely succeeded and the residual under correction responded only to surgery [4;6]. However, disappointing anatomic and objective functional outcomes have been frequently noted, along with painful arthritic long-term results, as the surgically treated patients were reviewed in the 1990s. This has stimulated renewed interest in previously developed nonoperative methods: the French method [7], developed in the late 1970s, and the Ponseti casting technique, developed by the author in 1948 [1;8].

The conservative treatment of the congenital clubfoot is based upon the successive and progressive correction of the malformations aiming at a normal joint alignment, the recovery of the

muscular balance to maintain this reduction and to finally reach the status of a mobile foot with a quasi-normal function [9].

The French method consists of daily manipulations of the newborn's clubfoot by a skilled therapist, stimulation of the muscles around the foot (particularly the peroneal muscles) and temporary immobilization of the foot with plaster cast so that the reduction achieved by the passive manipulations is maintained [10].

The French method was adopted in our department before 1998 after reports of success from French investigators [11]. We used this method until we adopted the Ponseti casting technique. The purpose of this study is to evaluate the results of the French method in conservative treatment of clubfoot for a period of 5 years.

### Material and Method

The patients included in this study had no other congenital anomaly of the foot and were less than 9 months old at the onset of treatment.

52 children (74 feet) were included in this retrospective study and were treated using the French method. The study did not consider the neurological and arthropotic types of clubfoot. Minimum follow-up was 20 months.

All feet were rated at initial presentation using the DiMeglio scale. The scores range from 1 to 19 and has been shown to be reliable and reproducible. Another study was made in our department to measure the interobserver reliability and it's available. A normal foot was rated 0. Feet scored 5 or less were considered benign (grade I), 6-10 moderate (grade II), 11-15 severe (grade III) and 16-20 very severe (grade IV) (Figure 1).

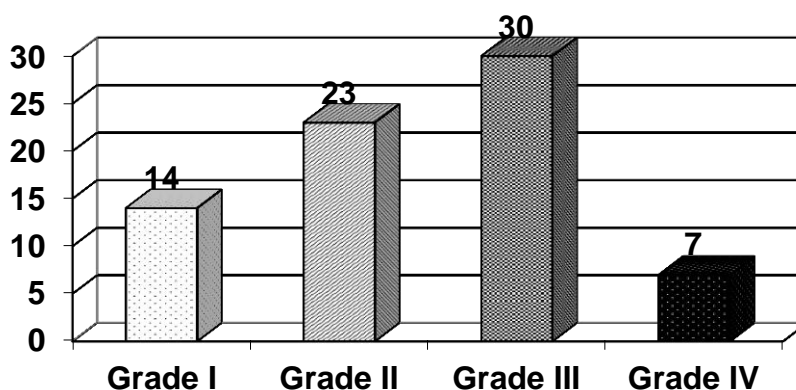


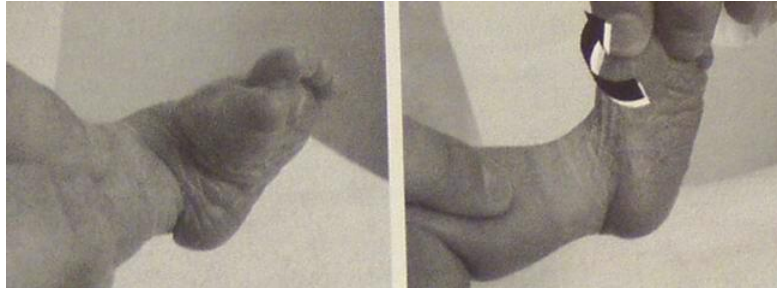
Figure 1. Distribution of cases according to the deformation degree

The initial cure consists in the mobilization-manipulation of the foot. This kineto-therapeutical stage starts in the first post-partum week, lasts for about two months and consists in manipulations made by parents at home. The parents are trained to carry this out. The exercises are organized in 3-4 sessions of about 15-20 minutes each. The stage is required because of the high risk of decubitus lesions due to plaster devices applied to the excessively fragile skin of the newborn.

The second stage consists in combining manipulations with successive plaster immobilizations. The procedure is successful only if the application of the plasters is strictly observed.

The aim of the first plaster lies in the correction of the foot torsion. Cavus is the consequence of the inner foot radius plantar hyperflexion. The natural tendency of the orthopedist is to correct all the deformations in the clubfoot from the very beginning. But this increases cavus, as the foot is displaced in pronation. In order to correct this deformation, the first plaster is put with the forefoot in supination, by extending the first foot radius so that the metatarsus is aligned in the same plane (the anti-cavus procedure) (Figure 2).

After cavus correction, varus is considered. To correct the varus, the navicular bone must be displaced laterally together with the cuboid and the calcaneus. To carry out this lateral movement, in abduction, the orthopedist must exert pressure upon the talus head, the navicular must regain its normal position versus the talus head while the forefoot is displaced laterally [9].



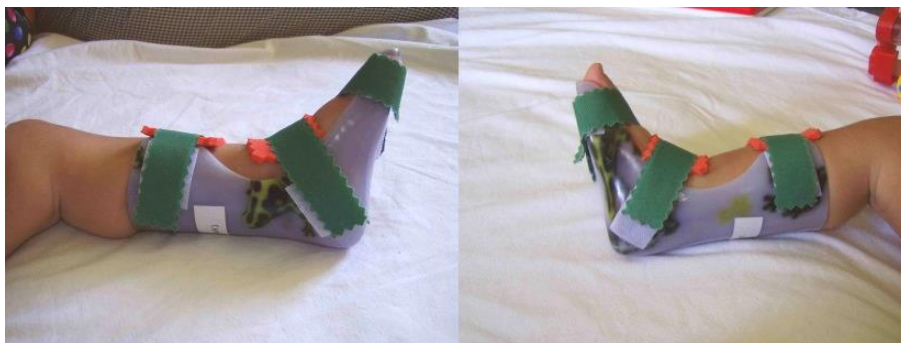
**Figure 2.** The anti-cavus procedure

The correction is fulfilled progressively, function of the foot flexibility. The final aim lies in putting the foot in abduction and slight pronation, with the equinus to be later on corrected. When the foot is flexible enough, the equinus is reduced and maintained at this level with the plaster. In case the equinus deformation withstands correction, the orthopedic treatment must be completed by percutaneous Achilles lengthening tenoplastia, followed by plaster immobilization for three weeks (Figure 3).



**Figure 3.** The final appearance of casts

The evolution was considered favorable when the quasi-normal foot shape was reached and when the foot dorsiflexion exceeded  $20^{\circ}$ . All the feet whose deformation was corrected were also subjected to orthosis afterwards. The orthosis used were of the fixed ankle type, in slight abduction, valgus and talus. The orthosis had to be carried on permanently up to the age of 1 year and only during bedtime in the case of one to two year old children (Figure 4).



**Figure 4.** Ankle orthosis

### *Statistics*

The SPSS/PC+ software package version 5.0 (SPSS Inc., Chicago, USA) was used for statistical analysis. Metric data were summarised as mean  $\pm$  standard deviation (SD) whenever the data proved to be normally distributed. The Shapiro-Wilk and Kolmogorov-Smirnov tests at a significance level of 5% were used to test the normality. The Student t-test (for independent groups and paired groups) was used to compare means of two groups whenever data proved to be normally distributed. Non-parametric tests (Mann-Whitney, Kruskal-Wallis, Wilcoxon) were used for comparisons whenever metric data proved to be non-normally distributed.

### **Results**

The average age at first presentation was  $3 \pm 1.85$  months with limits 1 month and 9 months. From all patients, 38 of them (73%) were under the age of 6 months and the other 14 patients (27%) were between 6 and 9 months of age.

12 patients (23%) have previously undergone another type of conservative treatment. All of them were more than 6 months old. Previous conservative treatment consisted of short leg cast immobilizations for periods between 1 and 3 weeks. The number of casts varied from 6 to 12 (median=8 casts). None of them had before presentation Achilles tenotomy.

At initial presentation all patients had one or all clubfoot deformities undercorrected and the indication for referral was posteromedial release in 80% of cases.

The mean ankle dorsiflexion measured  $-18.56^{\circ} \pm 17.32^{\circ}$ . The difference between study group and normal feet was statistically significant ( $p=0.03$ ).

For the correction of clubfeet by French method we used  $5 \pm 2$  casts for a mean period of  $15 \pm 6$  weeks.

The ankle dorsiflexion improved from  $-18.56^{\circ} \pm 17.32^{\circ}$  before treatment to  $4.26^{\circ} \pm 7.26^{\circ}$  after treatment ( $p=0.01$ ). The distance between the tip of the medial malleolus and the navicular tuberosity improved from  $1.12 \pm 0.58$  cm to  $1.69 \pm 0.6$  cm after treatment but was statistically significant lesser than normal distance of  $2.46 \pm 0.41$  cm ( $p=0.04$ ).

As the study progressed, it became evident that the feet that responded poorly to the conservative treatment and needed posteromedial releases usually could be identified within the first 6 months. At the end of the treatment period, 13 feet of 74 (17.56%) responded poor to the conservative treatment and needed posteromedial release.



Figure 5. Grade III clubfeet (before and after conservative treatment by French method)

## Discussion

The French method has proven to be effective in the nonoperative treatment of clubfoot. Intermediate-term results of French patients treated from the mid-1970s to early 1980s were first reported by Bensahel and Seringe in 1990 [12]. In nearly 50% of patients, the feet were well aligned, the range of motion was within normal limits and gait was normal. For those still needing surgery, operative procedures were usually limited to posterior structures only. However, the technique was practiced in a few French centers only and no classification system existed to allow comparisons between studies. Lately, the French method has been implemented at various institutions. It was introduced in the English literature in 1990. Souchet [13] reported on a new series of 350 feet treated this way. This group averaged 14 years of follow-up and had 77% good results in patients treated by the senior author, Henri Bensahel. It is a time-intensive treatment meant to correct the foot through a series of daily foot manipulations and casting. The initial results of the use of this method, as demonstrated by Richards [10] at the Texas Scottish Rite Hospital, show promise, with 42% of patients requiring no surgery, 20% requiring comprehensive posteromedial release, 29% requiring posterior release alone and 9% requiring Achilles tenotomy.

Dimeglio [14] et al developed a comprehensive classification system that precisely differentiated clubfoot severities and standardized terms in an effort to allow better exchange of information. Following refinement, this classification system was published in the English literature in 1995. This classification system is simple and reproducible and allows for reliable comparisons between studies that use various treatment techniques.

We have abandoned the French method and since 2003 we have used Ponseti's method for the treatment of all clubfeet. Follow-up on patients treated prospectively by Ponseti method is now sufficiently long to be the subject of a future report.

Currently, many orthopedic centers have adopted Ponseti's management algorithm, which includes a series of weekly visits to correct the foot followed by an Achilles tenotomy in as many as 84% of patients and prolonged wear of a foot abduction orthosis[1;8]. Alternative methods of tenotomy have been adopted. Some surgeons have found the release performed in the operating room to be more controlled and overall safer. Perhaps the largest departure from tenotomy has been the use of botulinum A injections into the gastrosoleus complex. Alvarez [15] has shown

dorsiflexion improvement with a single injection in 41 of 51 patients with follow-up between 1 week and 27 months.

### Conclusions

When the French method is used for infants with idiopathic clubfoot, over half of the affected feet will have excellent or good outcomes (no surgery or simple Achilles tenotomy). Approximately 30% require posterior releases but no surgery to the midfoot. Only 20% of clubfeet will need comprehensive posteromedial releases.

By observing the reduction anatomic-pathological norms, the results of the conservative treatment of the congenital clubfoot will be good, the correction achieved being either total or with a reduced deformation degree, involving surgery only in the case of residual deformations and not for an old severely deformed foot.

By avoiding extensive surgery and subsequent potential stiffness with muscle weakness, long-term improvements in anatomic and functional outcomes are anticipated.

### Conflict of Interest

The authors declare that they have no conflict of interest.

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