

# Medium Term Evaluation of the Results Achieved in the Treatment of Congenital Clubfoot at Paediatric Surgery and Orthopaedic Clinic, Tîrgu Mureş

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**Introduction:** Congenital clubfoot or talipes equinovarus is the most frequent congenital deformity of the lower extremity and we can define it as the position of the foot in varus, equines and the adduction of the forefoot.

**Material and method:** This study is based upon a retrospective study performed at the Paediatric Orthopaedic Surgery Clinic of Tîrgu Mureş between 2001–2010. The study group comprises a number of 153 patients. Here we present the classification, surgical and orthopaedic treatment, treatment of relapses, pre- and postoperative preparations, after care and follow-up protocol.

**Results:** Our group comprises 153 patients out of which 113 were male (73.85%) and 40 female (26.14%). Fifty-nine (38.56%) of them presented bilateral malformation, in 25 (16.33%) of them conventional treatment had satisfactory results, but the rest of the 128 patients (83.66%) required hospitalization in order to continue the applied conventional treatment and intervention. We detected associated anomalies in 34 of the studied patients. Out of these 128 patients we had 11 (8.59%) relapses. Post-operative we identified recurrent syndromes in 36 patients.

**Conclusions:** This study proves the effectiveness of the applied surgical treatment. The weak point of the treatment protocol we followed was the conventional treatment, thus we should increase effectiveness or adopt another method of treatment.

**Keywords:** clubfoot, turco, cast, orthopaedic

## Introduction

Congenital clubfoot or talipes equinovarus is the most frequent congenital deformity of the lower extremity and we can define it as the position of the foot in varus, equinus and the adduction of the forefoot, which is a permanent, fixed and somehow rigid position [1].

Congenital clubfoot has a significant incidence, therefore the correct treatment of such deformities requires special attention. The incidence varies according to geographic region and ethnicity. In the international specialty literature we found that this incidence varies from 0.65 to 1.89–2 cases per 1000 live births. In the national specialty literature and local studies, the incidence is 1–1.2 cases per 1000 live births [2]. Malformation is more common in young male patients than in young female patients, in our country the ratio being 2:1. Data from the international literature reports that up to 72% of the treated patients are young male patients and in up to 52% of the cases the malformation is bilateral [3]. It can be easily diagnosed because of the obviously vicious position of the foot, which can be in the following three malpositions: in the position of the foot in varus or equinus in relation to the calf and the adduction of the forefoot in relation to the rarefoot. Treatment should be initiated as early as possible for better results, but the etiology of this disease is ambiguous. The aim of the treatment is to attain a position of the foot which is as correct as possible from an anatomical and functional point of view [4].

## Material and method

This study is based upon a retrospective study performed at the Paediatric Orthopaedic Surgery Clinic, Tîrgu Mureş

between 2001–2010. The study group comprises a number of 153 patients. We included in this study all children aged between 0–17 years, treated at our clinic with congenital clubfoot, who presented for treatment during the 1<sup>st</sup>–14<sup>th</sup> day from their birth. We excluded only those patients who stopped the treatment before it was finalized. The classification of clubfoot was not applied. The results were considered good if at the clinical examination the anatomic recovery, static and dynamic functions were satisfactory. In case any of these criteria were not satisfied, the results were considered unsatisfactory.

In this paper we present the treatment methods of clubfoot performed at our clinic. Early diagnosis is extremely important because the rigidity of the foot increases exponentially at the same time with the development of the child. The treatment of congenital clubfoot may be performed with conservative and surgical methods. First we automatically started with the conservative treatment and we used the method presented below in all patients, which was continued till complete recovery or till the age of 1 year. In all those patients where the conservative treatment yielded poor results, we started the surgical treatment presented below.

The treatment of the clubfoot starts as early as possible after the birth of the child, ideally in the first 7–10 days. Usually the first initiative is the orthopaedic treatment. In the first stage the patient visits the outpatient speciality department weekly, then every two weeks and every three weeks.

Manipulation, massage and casting is not the responsibility of the plaster technician, but the physician's and a



Fig. 1. Bilateral (in this case) plaster device applied for correction, the base of our conservative treatment

well instructed team can help the specialist to achieve better results. When the patient presents at the outpatient speciality department, the old plaster device is removed, the child is washed and usually a short session of massage and manipulation with hydrating cream is performed. Subsequently the malposition rate is decreased, the equines, adduction and supination are also decreased without excessive strain, manual fixation and positioning are maintained by plaster cast and performed with the assistance of the plaster technician.

The plaster device used at our clinic is a splint in long plaster cast positioned on the posterior side of the lower limb inflected in 90 degrees, placed on a protection material (thin layer cotton wool bandage) the knee is flexed to 90 degrees and covered with bandage. It is important to avoid injuries, depression, too tight or loose application of the plaster device (Figure 1).

Treatment can be continued until the age of one year, but the success of conservative treatment can already be predicted at the age of 3–4 months. We have two possibilities: if the results are satisfactory we monitor the patient's evolution, recommend physical therapy and if necessary adjuvant therapy. In case we attained no satisfactory results until the age of one year, we chose surgery as further therapy.

Surgery as treatment option is the last initiative for correction. In our clinic physicians agreed upon the technique of the first initiative. According to our experience, the posterior-medial technique is the most recommended approach, hence we perform an alternative of the V. Turco technique (Figure 2).

We perform a posteromedial incision according to the Achilles tendon to the internal side of the foot until the capitulum of first metatarsal. The subcutaneous and aponeurotic tissues are dissected after proper hemostasis, the Achilles tendon, the long tendon of the hallux and toes, the tibial posterior vascular-nerve package are prepared, we isolate and open the medial and posterior articular capsules



Fig. 2. Operative technique: incision, the exposure of the flexor tendons and vascular-nervous elements

with a pair of dull but strong scissors perusing reducibility manually. After attaining a proper release, we perform the lengthening of the Achilles tendon, the long tendon of the hallux and toes and finally we section the calf. Subsequent to plague drainage, this is closed according to anatomical planes. The patient is immobilized in a plaster cast correction or hypercorrection device. After two weeks we remove the sutures, drainage and change the plaster cast device.

The plaster cast device is maintained for 6 weeks, period while the plaster cast device is changed 2 or 3 times and alterations of the skin and the occurrence of edema are closely monitored. Prophylactic antibiotic therapy with broad spectrum antibiotics is recommended after surgery. Postoperative follow-up is very important, the patient is initially called back for check-up after two weeks and then monthly, 6 months and annually up to the age of 16.

Regardless of the applied correction treatment, conservative or surgical, we have to follow the after care procedure as a completion to the correction procedures in order to prevent relapse, increase functionality and comfort through physical therapy, increase mobility, blood flow, prevent complications, prevent neurological foot and other complications. If necessary, we prescribe orthosis, or orthopedic shoes.

During treatment and after treatment the most important thing is to monitor the patient. In order to prevent recurrence, it is important to diagnose limitations and position the foot. If needed, we intervene repeatedly. Reinterventions are difficult, but should be performed as early as possible. Reintervention operations should be performed on soft tissues, mixed tissues and bones.

## Results

Out of the 153 patients included in the study, 113 were male (73.85%) and 40 female (26.14%). Fifty-nine (38.56%) of them presented bilateral malformations, where the affection of the two inferior extremities was approximately the same. In 25 (16.33%) out of the 153 patients conventional treatment had satisfactory results, but the rest of the 128 patients (83.66%) required hospitalization in order to continue the applied conventional treat-

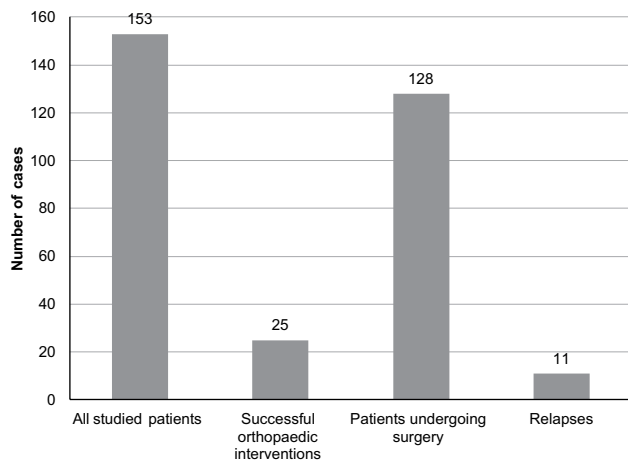


Fig. 3. Medium term results in the treatment of congenital clubfoot

ment and intervention after the age of 3 months, the total number of hospitalizations being 242. Out of the total of 128 (40.62%) hospitalized patients in 52 cases the affection was bilateral, 96 (75%) were young male patients and 32 (25%) were young female patients.

We found associated anomalies in 34 patients, as follows: spinal amyotrophy, mental retardation, epilepsy, disabling infantile encephalopathy, paraparesis, hydrocele, macrocephaly, kidney disorders, bilateral trigger thumb anomaly, arthrogryposis, imperforate anus, myelomeningocele, heart disease, congenital hip dislocation, dysplasia, hypospadias, duodenal atresia, anorectal atresia and pluri-malformation syndromes, 22 out of these 34 patients presented multiple associated malformations. Congenital clubfoot was most often associated with the following: cardiac anomalies in 4 cases, spastic paraparesis in 3 cases, hernia in 3 cases, and pluri-malformation syndrome in 3 cases.

Out of these 128 patients who required hospitalization, we had 11 (8.59%) relapses requiring reintervention, only 3 of them undergoing multiple interventions, which can be considered a good result (Figure 1).

Post-operative in the 128 patients who underwent surgical intervention we identified 36 patients with recurrent syndromes. Medium term postoperative results were satisfactory, however neurogenic foot was present in 12 cases, calf muscular atrophy in 15 cases and flatfoot in 9 cases.

## Discussions

The treatment of congenital clubfoot is a challenge for professionals. There is no clear protocol for treatment and treatment results. There is no standardized procedure developed yet. There are several treatment protocols, but none of them has managed to get monocracy. There is no agreement concerning the patient's age when various treatment stages should start and how to perform them [5].

We reached to a consensus that complies with data published in the specialty literature. Treatment should start as soon as possible by involving the neonatologist, family doctor and specialist, the patient's family must also be

involved in the therapy: when applying the plaster device, for maintenance, for monitoring the child for any complications, during physiotherapy, and for using special orthopedic shoes.

We should classify the severity of clubfoot in order to have reference values and track treatment results objectively. Widely spread classification systems are the Clubfoot Assessment Protocol (CAP) [6], Cummings and Dimeglio [7]. We consider that the Dimeglio score is easy to use, accurate, useful in tracking the effectiveness of the treatment and does not require X-ray examination [8].

Gender based distribution (73.85% young male patients), bilateral cases of clubfoot (38.56%) and the occurrence of malformations (22.22%) corresponds to data published in the speciality literature [7].

The best known and widely used treatment methods are the Ponsetti and Kite method. Compared to data published in the speciality literature, we were successful in 25 cases (16.33%), patients who started their orthopaedic treatment at an early stage, which is much below the reference value 50–55% published in the speciality literature. The results we achieved using a treatment protocol are similar to results published in the speciality literature, we had relapses in 8.59% of our cases, but by using the Ponsetti method some authors reported relapses only in 5% of the cases. We achieved good results in 91% of the cases by using combined therapy while according to authors who used the Ponsetti method combined with the conservative and adjuvant treatment techniques without major surgical interventions were successful in 95% of the cases [9].

Because of the conservative choice of therapy at our clinic we use the orthopaedic treatment method, gradual reduction at the same time of the 3 malpositions, method that is based on Ponsetti's method but different from Kite's in order to prevent the fixation of the foot in time.

The applied surgical procedure should be chosen according to the age of the patient, degree of stiffness, Dimeglio classification, but the surgeon's experience is also very important. The posteromedial approach is the most accepted method by the speciality literature too, the treatment protocol we used was efficient, we performed internal fixation only in older patients or in recurrent cases.

Preoperative preparation is essential and postoperative treatment may increase the degree of success, reduce the number of residual symptoms, where we do not have as good results as published in the specialty literature, their absence can lead slowly to relapses. It is important to respect stages of treatment, their order, timing, continuity and the use of proper treatment technique. If any of the treatment stages is skipped or not respected previously attained results may be compromised [10].

## Conclusions

We can state that the weak point of our treatment technique is the conservative treatment method, which should be upgraded. Our presently applied method is less effective

than the techniques presented in the speciality literature published in the USA and Western Europe. If we increase the efficacy of the conservative treatment, we can reduce the number of performed operations and our final results can be much better with less anxiety in our patients.

This study confirms the efficacy of the surgical treatment that we performed. Preoperative care is essential and postoperative treatment can increase efficacy, which reduce the number of residual symptoms, proved to be our weak point according to the speciality literature. Their absence may slowly lead to recurrences.

We should find experimental research techniques in order to test treatment methods.

We recommend the mandatory introduction of the Dimeglio score or CAP for assessing and monitoring treatment effectiveness.

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