

Ten year challenge with Ponseti method for clubfoot: our experience

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Summary. Equino-varus-adducted-supinated, also known as clubfoot, is the most frequent congenital malformation of the foot. Scientific evidences of the last decades has definitively confirmed the efficacy of the non-invasive Ponseti Technique, which is based on manipulation, plaster casts, percutaneous achillean tenotomy and stabilization of the foot using a brace. The aim of the article is to describe the experience of our third level hospital in treating clubfoot with Ponseti Method. Our data are similar to the ones in literature, confirming the effectiveness and good reproducibility of the Method. (www.actabiomedica.it)

Key words: congenital clubfoot, Ponseti Method, Achilles tenotomy, brace

Aim of the work

To describe the experience of our third level hospital in treating clubfoot with Ponseti Method and to compare the obtained results with those proposed by the scientific literature.

Background

Clubfoot (or equino-varus-adducted-supinated) is the most frequent congenital malformation of the foot. It is estimated that, in the world, 1-2 newborns every 1000 are affected by this pathology (150,000-200,000 newborns per year), with a male to female ratio of 2:1 and a major distribution in developing countries (80%) (1). Clubfoot is a complex deformity. It affects both feet in 50% of cases (2). If affected children will not properly be treated, they will not be capable to live a normal life because they will never be able to walk adequately. Over the decades, different corrective solutions have been proposed with varying degrees of invasiveness (3). Surgical treatment for clubfoot is frequently associated with complications,

with the final result of a foot that hardly reaches a complete functionality due to retractions and scarring secondary to the surgery itself (4). Scientific evidences of the last decades has definitively confirmed the efficacy of the non-invasive Ponseti Technique, which is based on manipulation, plaster casts, percutaneous achillean tenotomy and stabilization of the foot using a brace (5, 6). The Ponseti Method should start as soon as possible (between 7 and 10 days of life) and consists of manipulations of the foot followed by the application of a plaster cast, usually 5 or 6 casts are needed to correct supination and abduction deformity. The first femoropodalic cast must stay in place for 5-7 days, during this period the ligamentous structures adapt to the new position. After this term the cast is removed, the foot is re-evaluated, a new chalk is manipulated and positioned, and again it will work to progressively softer capsule-ligament structures to maintain the new position. This procedure is repeated until the correction of cavism and subsequently adduction and varism is reached. At the end of that period, if equinism is still present, we proceed with a minimally invasive tenotomy of the Achilles tendon. This is a 5-minutes lasting procedure, followed by the positioning of a cast

that will allow the tendon to heal in elongation (on average 20 days) (7). In order to maintain the correction obtained and prevent recurrences, it is essential to use the Mitchell-Ponseti brace (8). This brace has to be worn with a day night schedule that develops with the child age and the personal answer to the treatment. After the removal of the last cast, for the following 3 months, the Ponseti brace must be worn full time (23 hours per day) and then gradually reduce to 12-14 hours per day from 1 year up to 5 years of age (figure 1) (9, 10).

Materials and methods

We retrospectively examined all the cases of clubfoot treated with Ponseti Method from 2009 to 2019 in the Pediatric- Orthopedic Department of Burlo Garofolo Hospital in Trieste, Italy. The medical records of patients with clubfoot treated with Ponseti Method were reviewed. The inclusion criteria for the treatment was a congenital clubfoot which was clinically diagnosed. Exclusion criterion was the presence of previous clubfoot treatment and the premature quit of the treatment. We used Pirani Clinical Score to evaluate clubfoot severity (11). The clinical evaluation was performed before the first manipulation and cast application; subsequently we made a clinical evaluation with Pirani score at every cast replacement.

Results

In the present study 96 children were treated: 62% had bilateral clubfoot and 38% monolateral of which 20% right and 18% left. We had 73% boys and 27% girls patients, an higher rate of males and bilateral feet if compared with literature (12). In a further article, although this evidence, Zionts et al. demonstrated that there is no difference in severity of clubfoot due to sex. Farther, on average, bilateral patients did not have increased severity, but a larger range of severity compared with those who have unilateral deformity (13). The mean Pirani score in our patients was 5.77, only 5 children had a Pirani score lower than 5. The mean number of plaster cast used was 5.62 per patient, with a minimum of 3 and a maximum of 9 casts. To eliminate residual equinus, it is required an Achilles percutaneous tenotomy (figure 2) followed by three weeks of casting to aid healing the tendon. In our study the tenotomy was realized in 92,7% of the patients. According to major studies Achilles tenotomy is required in all the children with initial Pirani score greater than 5, while in patients with a Pirani score lower than 3 it seems not needed (14). The maintenance phase then involved holding the foot in an extrarotation and dorsiflexion brace (The Mitchell-Ponseti brace) for 23 hours per day for 3 months. Progressively, the time of use of the device can be decreased until 12 -14 hours (worn during the night) until five years of age (9). However, we use an individualised protocol for each children.



Figure 1. Brace position after Achilles tenotomy



Figure 2. Achilles tenotomy



Figure 3. A phase of TA transposition

The most dreadful complications is recurrence. The lack of family compliance to the bracing protocol is the leading cause of relapses and failure of the treatment (15). In a study of 73 feet treated with Ponseti Method, 24 showed recurrence (33%), and the only relevant correlation was the noncompliance to the brace (16). We observed a relapse rate of 10,4% (10/96 children), that conforms to literature where minimum relapse rate is 3,7% (17) and the maximum relapse rate was 27.1% (18). While 6 out of 10 children showed a complete response to the recasting only for relapse, 4 of them needed both recasting and surgical treatment. The surgical procedures consisted of: Achilles Z lengthening and posterior subtalar and ankle capsulotomies (2 children), Achilles Z lengthening, posterior subtalar and ankle capsulotomies and TA transposition (figure 3) (2 children). In our experience the causes of the relapses have to be found in the early interruption of the treatment, co-morbidity and bad compliance to the use of the brace.

Conclusions

The Ponseti Method is, currently, the “Gold Standard” for congenital clubfoot. In 2012, a survey of membership of the Pediatric Orthopedic Society of North America indicated that 96,7% use the Ponseti Method to treat clubfoot (19). A systematic review of 2014 shown that 113 countries (59%) all over the world performed the Ponseti Method. This treatment with



Figure 4 a, b. The clinical case of A. V. a) First day of Treatment, b) 7 years old

its small rate of complication, low cost, and elevated effectiveness, has a great potential to treat clubfoot in both developed and undeveloped countries (20). It does not require major surgery, unless the recurrence of relapses, but to succeed it is also very important a primary commitment from the family. The first step is prenatal diagnosis and counselling, where the specialist explains the Ponseti Method and establish the first contact with the parents of the future patient. During the first post natal evaluation the doctor reaffirm the importance of the Method and its phases, underlining the importance of the family compliance to it. The very success of the Method is related to an early onset of the treatment, the correct use of the brace in order to prevent the relapses and to the attentive participation to the scheduled follow ups (figure 4A and B). Our data are similar to the ones in literature, confirming the effectiveness and good reproducibility of the Method (21).

Conflict of interest: Each author declares that he or she has no commercial associations (e.g. consultancies, stock ownership, equity interest, patent/licensing arrangement etc.) that might pose a conflict of interest in connection with the submitted article

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