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Korzyści w leczeniu stopy końsko szpotawej u dzieci przy pomocy metody Ponsetiego – lepsza efektywność przy mniejszej inwazyjności

Streszczenie

Wstęp. Wrodzona stopa końsko szpotawa jest jednym z głównych problemów w ortopedii dziecięcej. Leczenie stopy końsko szpotawej bywa kontrowersyjne i nadal stanowi jedno z większych wyzwań w ortopedii dziecięcej.

Cel. Głównym celem pracy było przedstawienie przewagi i korzyści jakie przynosi leczenie metodą Ponsetiego stopy końsko szpotawej u dzieci.

Materiał i metody. Praca oparta jest na materiale Kliniki Ortopedii i Rehabilitacji Dziecięcej UM w Lublinie. W latach 2007-2011 leczono metodą Ponsetiego 58 pacjentów z 69 stopami końsko szpotawymi.

Wyniki. Wyniki leczenia zostały przedstawione na podstawie analizy zakresów ruchów oraz oceny punktowej wg Piraniego (średni okres obserwacji 26 miesięcy). Pokazywało to stopień wady i odpowiedź na jej leczenie. Wynik leczenia wszystkich pacjentów był zawarty od 4,5 do 6 punktów. U wszystkich leczonych pacjentów osiągnięto wynik od 0,5 do 1,5 punktu. Oceniano rezultaty leczenia na bardzo dobre i dobre u 92% pacjentów. Dla porównania, wstecznie analizowano 125 pacjentów leczonych w Klinice w latach 1990-2000 z powodu stopy końsko szpotawej innymi metodami. Zakres metod leczenia operacyjnego obejmował zabiegi wydłużenia ścięgna piętowego, szerokiego uwolnienia przysródkowego, tylnego i bocznego stopy z wydłużeniem lub bez ścięgna Achillesa.

Wnioski. W wypadku ścisłego przestrzegania założeń metody Ponsetiego osiągnięto bardzo dobre lub dobre rezultaty leczenia i nie odnotowano nawrotów wady. Metoda ta jest polecana w postępowaniu leczniczym w celu uniknięcia bardziej agresywnych metod leczenia w przyszłości. Leczenie metodą Ponsetiego jest stosunkowo proste i mniej obciążające dla małych pacjentów. Metoda Ponsetiego jest również bardziej skuteczna w porównaniu do innych technik leczenia w/w wady stosowanych w Klinice.

Słowa kluczowe: wrodzona stopa końsko szpotawa, metoda Ponsetiego, ortopedia dziecięca.

Benefits in treatment of congenital clubfoot using the Ponseti method – less aggressive with more efficiency

Abstract

Introduction. Clubfoot is one of the most common problems in pediatric orthopaedics. The treatment of clubfoot is controversial and continues to be one of the biggest challenges in pediatric orthopaedics.

Aim. The main objective of this paper is to present advantages and benefits in treatment of congenital clubfoot by Ponseti method.

Material and methods. The paper is based on material taken from patients treated in Children's Orthopaedic Clinic and Rehabilitation Department Medical University of Lublin between the years 2007-2011. A group of 58 patients with 69 idiopathic clubfeet was followed prospectively while being managed with the Ponseti method.

Results. During the analysis of our final results we presented the data after follow-up of all patients (median 26 months), together with a sub-analysis of patients according to Pirani's scale. It assessed the severity of clubfoot deformity and the response for treatment. The scores for all patients before the treatment ranged from 4.5 to 6 points. After the treatment we accomplished a score of 0.5 to 1.5 points in all 69 treated feet. We evaluated the results of treatment as good or very good for 92% of patients. As comparison we retrospectively analyzed 125 patients treated between 1990-2000 with various type of operations. Those procedures ranged from a percutaneous heelcord lengthening to a wide release of medial, posterior, and lateral structures, with or without transfer of the anterior tibial tendon.

Conclusions. Our study supports the principles of Ponseti's method, because in cases when these principles were strictly obeyed all patients accomplished satisfactory results and there have been no recurrences that are known to us. Therefore, we strongly recommend using this method to avoid more invasive surgery in future.

Non-operative treatment of clubfoot provides a lower complication rate, less pain, and higher function as the patient ages than operative treatment. That kind of treatment has led us to far to better results than the former more aggressive procedures. We emphasize the fact that other operational techniques have not been such efficient so far. Former surgery methods were either more complicated or more invasive.

Keywords: congenital clubfoot, Ponseti method, pediatric orthopedics.

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INTRODUCTION

Clubfoot besides DDH is one of the two most common problems in pediatric orthopedics [1,2]. The treatment of clubfoot in some cases remains controversial. Thus congenital club foot still is one of the biggest challenges in pediatric orthopedics. The incidence of idiopathic clubfoot is estimated to be one to two per 1000 live births. It has a male predominance of 2:1 and occurs in both feet about 50 percent of the time. There is a much higher incidence if the patient has a positive family history for clubfoot. The deformity is a 3-dimension malformation where the axis of deformation is in the central part of interosseous talo-calcaneal ligament [3].

Some scientific investigators concluded that malformed bones, abnormalities of muscle, joint or vascular lesions and/or abnormal ligaments and tendons caused congenital clubfoot. Another opinion is that congenital clubfoot results when external forces put the foot or the feet in a faulty position while the fetus is developing [4]. Nowadays the most widely accepted theory is that clubfoot is caused by a combination of genetic and environmental factors [5].

Treatment of clubfoot has evolved from a minimal surgery to a casting technique and then to extensive surgery. Within the years, the principles of surgical technique in treatment of congenital clubfoot were changed and modified many times.

Ponseti described his method in late 1950's. Non-operative treatment of clubfoot provides a lower complication rate, less pain, and higher function as the patient ages than operative treatment. Ponseti technique has a 92% success rate. Complications are few and minor – limited to equipment used and cast technique. His method is an innovative, conservative treatment for clubfoot involving a gentle manipulation of the child's foot and the application of toe-to-groin plaster casts that is followed by bracing and tenotomy [6].

Within the period of 45 years (from 1974 to 2000) in Children's Orthopaedic Clinic and Rehabilitation Department principles of surgical technique in treatment of congenital club foot were many times changed and modified.

AIM

The main objective of this paper is to present the some advantages and benefits in treatment of congenital clubfoot by Ponseti method.

MATERIAL AND METHODS

The paper is based on data for 58 children – 41 boys and 17 girls with 69 clubfeet treated during the period of 2007 to 2012. We monitored the deformation before each extension and casting, and before and after the tenotomy. To evaluate the effects of treatment we used Pirani's scale with its six main features concerning external edge, medial crease and „covering” of the head of the talus bone in the mid-foot region and posterior crease, incorrect equinal deformation and „empty heel in hind-foot region. According to Pirani's scale a total score of 6 points represents a severe clubfoot with a score of 0 points representing a normal foot. We compare results of treatment with former analysis of treatment by other methods. Those compared patients were treated with various types of operations in the years 1990-2000.

RESULTS

All 58 patients were newborns with 11 of them suffering from bilateral deformation. According to Bensachel-Dimeglio's classification 43 feet represented stiff type of deformation and most of the patients had a maximal or medium grade of equinal, varus and adduction deformation.

We started treating the patients as early as possible. For 35 patients redresions (extensions) and casting treatment began in the first or second day of life. Clubfeet were corrected with manipulations every 5 to 7 days followed by plaster-cast applications. Usually, the duration of such redresions and casting treatment was 5 to 8 weeks. More were sometimes needed in the most severe cases of clubfoot. Then we measured the residual deformation for varus and adduction through passive correction. For all treated patients we accomplished satisfactory results.

When the correction of adduction and supination of the calcaneum bone was completed, the tenotomy of Achilles tendon was performed. This minor surgical procedure, conducted under a light sedation, was applied to 65 children out of the total number of 67 treated children. For two children excellent results were achieved after redresions followed by bracing so that no surgery was required. The remaining patients underwent the tenotomy followed by a 3-week long holding cast period that allowed the tendon to regenerate longer. In 91% of treated feet we achieved sufficient correction in sagittal plane and ability of passive dorsal flexion. For the final correction in all treated cases we used TIBAX or CLUBAX device, which is a simple instrument to perform corrections in all three planes. Such orthosis helped to preserve the good results after surgery. We observed a decrease of dorsal flexion only in 5 cases. However, those five children did not use that device strictly according to our recommendation. During analysis of our final results we presented data after follow-up of all patients (median 26 months), together with a sub-analysis of patients according to Pirani's scale. It assessed the severity of clubfoot deformity and the response for treatment. The scores for all patients before the treatment ranged from 4.5 to 6 points. After the treatment we accomplished a score of 0.5 to 1.5 points in all 63 treated feet. We evaluated results of treatment as good or very good for 92 % of patients. For the remaining patients the results were evaluated as satisfactory. (Figure 1)

FIGURE 1. Results of operative treatment by Ponseti method in 2007-2012 period.

As comparison we retrospectively analyzed 125 patients treated between 1990-2000 with various type of operations presenting below (Figure 2). Those procedures ranged from a percutaneous heelcord lengthening to a wide release of medial, posterior, and lateral structures, with or without transfer of the anterior tibial tendon.

FIGURE 2. Types of operations in 1990-2000.

Final results of our treatment are presented in Figure 2, according to modification of surgical technique. During follow-up besides good or very good results we achieved more than 22% of poor results. Those children need some procedures in the future but final analysis of the their outcome was not performed (Figure 3).

FIGURE 3. Results of operative treatment in 1990-2000.

DISCUSSION AND CONCLUSIONS

The main objective of treatment of congenital clubfoot is to obtain pain-free, plantigrade foot, with good mobility and without calluses. In general, children who suffer from such deformation undergo various type of surgery to complete the correction [7,8].

For the last 30 years, the operative procedure most often performed has been the posteromedial subtalar release. The basic procedure generally employed changed over the years, with some modifications of incision, and amount of subtalar release. As others have reported, recurrence rates were higher and there were some severe overcorrection percentage so far. Much more higher than for Ponseti protocol [7].

There is general agreement that initial treatment of congenital clubfoot should be nonsurgical. Napiontek in 2004

introduced and widely popularized Ponseti method in Poland [9] and since 2007 we have been using it in our Clinic. The treatment is simple and initiated as soon as possible, preferably within the first week of life. The majority of clubfeet can be corrected in infancy in about six to eight weeks with the proper gentle manipulations and plaster casts followed by tenotomy [10].

In our study non operative procedures took usually 5 to 8 weeks which is a similar period to Ponseti standards and that what other authors report [11,12]. For the treatment performed at our clinic, tenotomy of the Achilles tendon was crucial for the completion of a successful correction of the foot. However that was not so complicated procedure and that was real benefit for our patients. Therefore, bracing is also essential. Thus, it can be performed in outpatient department, which is very important economic and psychological factor [13,14]. In our results we noticed that use the orthosis as it was prescribed was mandatory and helped in decreasing of recurrence rate [15,16].

In essence, our study supports the principles of Ponseti's method, because in cases when these principles were strictly obeyed all patients accomplished satisfactory results and there have been no recurrences that are known to us [17-19]. Therefore, we strongly recommend using this method to avoid more invasive surgery in future. Non-operative treatment of clubfoot provides a lower complication rate, less pain, and higher function as the patient ages than operative treatment. That kind of treatment has led us to far better result than former more aggressive procedures. We emphasize the fact that other operational techniques have not been such efficient so far. Former surgery methods were either more complicated or more invasive. A wide surgical correction of the talonavicular, talocalcaneal, and calcaneocuboid joints requires wire fixation through the joint cartilage. Inevitably, the joint cartilages, as well as the joint capsules, are damaged and joint stiffness sets in. A few reports indicate that deep scarring almost invariably follows surgery, which appears to be particularly severe in infants. In addition, the average failure rate of clubfoot surgery is 25% (range 13% to 50%, over than 22% in our material) and many complications can occur including wound problems, persistent forefoot supination, loss of reduction and recurrence, overcorrection of the hindfoot, dorsal subluxation of the navicular, and loss of normal motion of the ankle and subtalar joints [20]. To provide patients with a functional, pain-free, normal- looking foot, with good mobility, without calluses, and requiring no special shoes, and to obtain this in a low cost-effective way, further research will be needed to fully understand the pathogenesis of clubfoot and the effects of treatment, not only in terms of foot correction, but also of long-term results and quality of life. One thing that is definitely clear according to presented material is a very good early follow up results concerning Ponseti protocol. The authors of this paper are currently involved in a study to assess late results of treatment in this group of patients. On the presented data we are sure that Ponseti method has more important advantages than former procedures. Mainly, it is more effective and the deformity can be corrected in a relatively short time. Thus, this method is of particular value for the initial treatment of congenital clubfoot deformity.

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