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Only Casting Ponseti Treatment for Pes Equinovarus: Satisfactory long-term clinical results without achillotomy

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Abstract

The purpose of this study is to evaluate long-term clinical results of pes equinovarus patients treated with the Ponseti casting method without achillotomy. 13 feet of 10 patients who were treated between August 2004 and April 2007 were re-examined in 2020 April. The mean Pirani and Dimeglio scores were 4.5 (Range:4-6) and 14.5 (Range:12- 18) at the beginning of the treatment. At the last follow-up, the mean of the American Orthopaedic Foot & Ankle Society (AOFAS) score was 88.9 (Range: 81-96. The mean plantar flexion was 25 degrees (Range: 20-30). The mean forefoot adductus was measured to be 7 degrees (Range: 0-10). The mean heel varus while standing was 4.5 degrees (Range: 0-10). There was no loss of muscle power in ankle dorsiflexion and plantar flexion. All of the patients were free of pain and were integrated into life. If neutral dorsiflexion is acquired without achillotomy, mild foot deformity and a moderate ankle range of motion restriction are well tolerated after Ponseti treatment in the long term.

Keywords: Pes equinovarus, Ponseti method, Achillotomy, Long-term follow-up.

Introduction

Pes eqinovarus (PEV) is a complex foot deformity with an incidence of 1/1000 live births and is predominantly a disease of the low-income population (1). Treatment of PEV is difficult and requires a good understanding of pathological anatomy. Moreover, casting a deformed baby's foot requires experience (2). Treatment modalities have evolved enormously in time following

the accumulation of knowledge on the subject but they provided limited success rates (3). Early treatment was reported to ameliorate the treatment results (4).

Presented in 1930, and utilized worldwide thereafter, the Kite method had some drawbacks. Lately, Ponseti's combined casting and minor surgical intervention treatment gained popularity after the publication of its long-term results in 1996 (5). Ponseti reported a need for achillotomy in 90% of patients to receive at least 10 degrees of dorsiflexion (6). Although some cases are syndromic and hard to treat with initial rigidity and frequent relapses requiring frequently more extensive surgeries, 90% of patients are idiopathic in origin and more flexible than those (7-8). Naturally, there is a tendency for recurrences requiring re-treatment if the feet are left alone after cast correction. This recurrence phenomenon was attributed to retractile myofibroblastic cells by Ponseti, on the other hand, the disease is also seen in more elastic patients having Down syndrome (9,10).

Studies of Ponseti demonstrated that the child's foot had elastic fibers in tendons and ligaments and this property gives an excellent opportunity to treat PEV in a more conservative manner (11). Based on manipulations and strapping, the French method is the only fully conservative method with comparable results but a heavier workload compared to the Ponseti method (12).

In this study, the clinical result of casting according to the Ponseti method without any surgical intervention in idiopathic PEV was investigated. The authors hypothesized a satisfactory result in patients who received only casting treatment in idiopathic PEV patients.

Materials and Methods

This is a cross-sectional monocenter study. In this study, patients who were admitted to Sisli Etfal Training and Research Hospital between August 2004 and April 2007 were included. 36 patients were recorded in the hospital registry in the reported period. Of the 26 patients whose treatment was completed, 10 patients, who could be reached were included in the study.

Initial Pirani and Dimeglio scores were noted to have the baseline information of each patient. At the last follow-up foot radiographs and clinical examination were done to evaluate residual deformity. Muscle power was evaluated according to a 5/5 scale. Ankle range of motion was examined and AOFAS scores were recorded at the last follow-up. Patient satisfaction over a scale of 0 to 10 was noted and their approach to surgery.

Ponseti Method

In the Ponseti method, all deformities of the involved foot are corrected simultaneously (6). Ponseti found that the point of rotation in PEV was the talar head and he proposed changing the pressure point during casting from the calcaneo-navicular joint to the talar head. Ponseti also found that the deformity of the hindfoot is only correctible with the correction of the anterior part of the foot. He stated that the foot cavus was restored without forcing the pronation of the anterior part of the foot. However, forcing the foot to pronation before the forefoot correction prevented the hindfoot correction by locking the calcaneus. Furthermore, forceful manipulations were forbidden as they caused microfractures and eventual fibrosis in the foot which requires five or six casts in general (13).

Ponseti preferred long leg casts to control all of the deformities which may affect the knee. The optimal correction was defined as 70 degrees abduction and 10 degrees dorsiflexion. The last cast is maintained for 3 weeks in this position and a feet abduction brace is utilized in the same position for 2 to 4 years to prevent recurrences (14).

This study was approved by the local ethics committee and informed consent of all of the parents and patients was taken according to Helsinki Declaration.

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Results

2 females and 8 males, a total of 10 patients were included. The study included an overall 13 idiopathic PEV feet from the outpatient clinic with unilateral involvement in 6 patients and bilateral involvement in 4 patients. One foot of a patient was not included in the evaluation because of an achillotomy. The mean age of the patients at the last follow-up was 13.6 (Range 12-16 years).

All of the patients were cast by the same fellow under the supervision of an experienced team of surgeons in the outward clinic. None of the patients were hospitalized. All of the patients had early intervention in the first month of their life. The mean initial Pirani scores of the patients were 4.50 (Range:4-6) and the mean initial Dimeglio scores were 14.5 (Range: 12-18). An average of 7.1 (Range: 5-9) plaster casts were applied to the patients. The plasters were changed weekly. At the end of the casting, the patients carried an abduction and external rotation brace with a connecting bar between two legs all day for 3 months, and after 8 hours during the day for 3 months. The device was used in all patients up to the age of 3.5 years at night. No major complications were observed in any of the patients.

At the last follow-up, it was observed that all patients had an ankle dorsal and plantar flexion strength of 5/5. It was observed that the mean dorsiflexion of the foot was 5 degrees (Range: 0-10). The mean plantar flexion was measured as 25 degrees (Range: 20-30). At the last follow-up, it was measured that the adducts on the front of the foot were 7 degrees (Range: 0-10) on average and the heel varus was 4.5 degrees (Range: 0-10) while standing.

AOFAS score and patient satisfaction were considerably high in our patient population. The mean AOFAS scores were 88.9 (Range: 81-96). Patients reported that 6 of them had no pain, 4 of them had pain after excessive exertion, none of them used support in daily activities, and 3 kilometers of walking could be done without any problems in all patients.

When the patients were asked to rate their satisfaction out of 10, 3 patients gave 8 points, 4 patients gave 9 points and 3 patients gave 10 points. The average satisfaction rate was found to be 90%. 7 patients reported that they would not describe themselves as disabled. 3 patients felt completely normal and none of them would allow their feet to be operated on.

Discussion

Although this patient group for whom we applied Ponseti treatment was treated at the beginning of our learning curve, no recurrence requiring recasting was observed in the patients included in the study. The initial foot deformities of the patients were not severe as can be observed from the initial scores.

Ponseti treatment takes at least 5 weeks and to proceed more easily and decrease the cast numbers Ponseti advised achillotomy at the last casting (5,6). In the light of the study of Souchet et al. which reported favorable results only with manipulation, in this study, no patients received achillotomy (12). However, the mean number of casts is higher than that of the originally proposed.

In the last follow up they had mildly limited dorsiflexion, however, the patients could perform many functions including running, they did not avoid heavy work, and described themselves as normal. Despite the low number of patients in this study, it was observed that patients with plantigrade, strong, functional, and pain-free feet could tolerate some foot deformity and dorsiflexion limitation very well, with Ponseti treatment without achillotomy. All patients were able to walk without support and use their feet in daily life without any problems. It was noted that one of our patients was a licensed junior football player and was operated a for an anterior cruciate ligament rupture.

Reproducing the same radiological outcomes with Ponseti, in our patients, bone deformities were present in the foot radiographs of all patients (15). It was observed that the average dorsiflexion of the patients was 5 degrees, which is less than the limit targeted by Ponseti. In the literature, it has been reported that Achilles tenotomy is necessary in 70-90% of patients and the need for achilotomy is higher in patients with severe Pirani and Dimeglio scores (16,17). This study showed that in the case of mild deformities, it is possible to avoid achillotomy which carries complication risks like additional injuries to important anatomical structures, hematoma formation, and infection (18).

This study has limitations of having a limited study population and therefore, a limited scientific impact. However, the treatment strategy enrolled in this study is rare and merits to be presented. On the other side, the follow-up time is relatively long which is not negligible.

Conclusion

In idiopathic clubfoot with the expense of an increasing casting, long-term results of Ponseti treatment without achillotomy are favorable and may be considered as an option for families who are reluctant to surgery in case neutral dorsiflexion is reached with only casting.

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