

Clubfoot management by the Ponseti technique in Saudi patients

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ABSTRACT

الأهداف: تقييم فعالية طريقة بونستي في علاج حنف القدم عند الأطفال السعوديين.

الطريقة: تم تجميع بيانات 175 مريض مصاب بحنف القدم (253 قدم) خلال الفترة من سبتمبر 2002 إلى يونيو 2008م، والذين تم علاجهم بطريقة بونستي في مدينة الملك عبد العزيز - الرياض - المملكة العربية السعودية. تم استخدام حرز بيراني لتقييم حنف القدم في هذه الدراسة.

النتائج: كان مجال عمر الأطفال ما بين أسبوع واحد إلى 48 أسبوع و متوسط العمر 6.5 أسبوع. و كان متوسط متابعة المرضى 37 شهر (مجال ما بين سنة واحدة إلى 6 سنوات و 7 أشهر). كان متوسط الوقت لحدوث التصحيح 5.3 أسبوع (مجال ما بين 4 إلى 10 أسابيع). لم يتم تصحيح أقدام 6 مرضى (8 أقدام) (3.4%) بالجبس الأولي، واحتاجوا إلى جراحة مبكرة. في المقابل حدث التصحيح الكامل في 169 مريض (227 قدم) (96.6%). تم بضع الأوتار في كل المرضى ماعدا مريض واحد (قدمين) (0.9%). بينما حدثت الانتكاسة في 34 مريض (48 قدم) (21.1%). لم تحتاج 179 قدم (78.9%) إلى أي علاج آخر، واحتاجت 4 أقدام فقط (1.8%) إلى اطلاق خلفي طبي زائد. تم ملاحظة مضاعفات ثانوية عند 14 مريض (18 قدم) (7.9%).

خاتمة: تعد طريقة بونستي طريقة آمنة، ذات مردود في العلاج التحفظي لحنف القدم، وتساعد في التقليل من عدد التدخلات الجراحية لتصحيح التشوهات عند المرضى السعوديين. وهي طريقة سهلة للفهم والتطبيق من قبل معظم جراحي العظام.

Objective: To assess the effectiveness of the Ponseti technique in the treatment of clubfoot in Saudi children.

Methods: The data of 175 patients (235 feet), who presented with clubfeet from September 2002 to June 2008 and who were treated with the Ponseti technique at King Abdulaziz Medical City in Riyadh, Kingdom of Saudi Arabia were collected and studied retrospectively. The Pirani score for clubfoot evaluation was used in this study.

Results: Age ranged from one week to 48 weeks, with an average age of 6.5 weeks. The average follow up was 37 months (range one year to 6 years and 7 months). The average time to obtain correction was 5.3 weeks (range 4-10 weeks). Six patients (8 feet) (3.4%) were not corrected with initial casting and required early surgery. Full correction was obtained in 169 patients (227 feet) (96.6%). Tenotomies were performed in all but one patient (2 feet) (0.9%). Thirty-four patients (48 feet) (21.1%) relapsed. One hundred and seventy-nine feet (78.9%) required no further treatment, and only 4 feet (1.8%) required a more extensive posterior-medial release. Minor complications were noted in 14 patients (18 feet) (7.9%).

Conclusion: The Ponseti technique is a safe and effective conservative treatment of clubfoot that decreases the number of surgical interventions needed for the correction of the deformation in our Saudi patients. It is an easy method to understand and to apply by most orthopedic surgeons.

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The idiopathic clubfoot is one of the most common congenital deformities easily diagnosed at birth. Idiopathic clubfoot affects approximately 1-2 per 1000 births.¹ Ponseti² obtained correction of the chondro-osseous element of clubfeet by using his technique of conservative treatment, and reported 74% good or excellent results after 30 years of follow-up. With more careful attention to technique and plaster casting,

Ponseti reported satisfactory results as high as 90%.^{3,4} The purpose of the present study was to assess the effectiveness of the Ponseti technique in the treatment of clubfeet in Saudi patients.

Methods. After exclusion of 4 patients lost to follow up, the data of 175 patients (235 feet), who presented with clubfeet from September 2002 to June 2008 and were treated with the Ponseti technique, were studied retrospectively at King Abdulaziz Medical City, Riyadh, Kingdom of Saudi Arabia. Institutional review board approval was obtained for this study. Concerning etiology, 4 patients (7 feet) had arthrogryposis multiplex congenita, 2 patients (2 feet) had Larsen's syndrome, 2 patients (4 feet) had spina bifida, and 167 patients (222 feet) were idiopathic. The protocol described by Ponseti⁵⁻⁷ was followed except for percutaneous Achilles tenotomy, which was performed in the operating room under general anesthesia instead of local anesthesia in the clinic for sterility purposes.

Brief description of the Ponseti technique. The first step is to correct the cavus deformity by positioning the forefoot in the proper alignment with the hindfoot. This is addressed in the first cast by supinating the forefoot to bring it in line with the hindfoot. In the subsequent casts, manipulation consists of gradual abduction of the foot beneath the stabilized talar head. After obtaining full abduction of the foot (around 60°), which usually occurs after 4 or 5 casts, the amount of ankle dorsiflexion is assessed. If 15° of dorsiflexion cannot be obtained at that time, a percutaneous heel cord tenotomy should be performed. This procedure can be carried out in the clinic using local anesthesia. The last cast is left in slight dorsiflexion and full abduction for 3 weeks followed by the application of a Dennis-Brown Brace (DBB). The DBB should be worn for 23 hours a day in the first 3 months followed by wearing at nighttime and naptime for 3-4 years.⁵

At every visit for casting, each clubfoot was scored using the Pirani's 6-point scoring system^{7,8} to assess the severity of the deformity (Figure 1). Demographic data were collected for gender, age at initial visit when the first cast was applied, number of casts, any further treatment (for example, recasting, surgery) that was required, compliance with the foot braces, and complications. Results were excluded from the analysis if there were no regular visits (weekly visit) for manipulation and cast application, incomplete data, and follow up less than one year. Microsoft Office Excel 2003 was used for descriptive analysis in this study including mean, average and percentage.

Results. At the initial visit, the mean age of the 175 patients (235 club feet) was 6.5 weeks (range 1-

48 weeks). Seventy-one patients were females (40.6%) and 104 were males (59.4%). Bilateral clubfeet were found in 60 (34.3%) patients, left foot in 75 (42.8%) patients, and right foot in 40 (22.9%) patients. Three (7%) patients had a positive family history of clubfoot. The average time to obtain full correction was 5.3 weeks (range 4-10 weeks), and the average follow up period was 37 months (range one year to 6 years and 7 months). The number of casts used for each foot ranged from 3-8 casts, with an average of 5.2 casts. An average Pirani score at initial cast was 5.8/6 (range 5.5-6) versus 0.5/6 (range 0-1) at the end of casting. Six patients (8 feet) (3.4%) were not corrected with initial casting and required early surgery. The average age of these 6 patients at the initial casting was 12 weeks (range 4-48 weeks). One (0.4%) foot had talocalcaneal coalition, 3 (1.3%) feet were associated with arthrogryposis, and 4 (1.7%) feet were idiopathic. Full correction was obtained in 169 patients (227 feet) (96.6%) (Figure 2). Full correction was defined as a plantigrade foot with a normal hindfoot, midfoot, and forefoot on clinical examination. Ankle dorsiflexion on knee extension was measured in the outpatient clinic, and considered to be normal if measured more than 10 degrees. Percutaneous tenotomies were performed if ankle dorsiflexion was

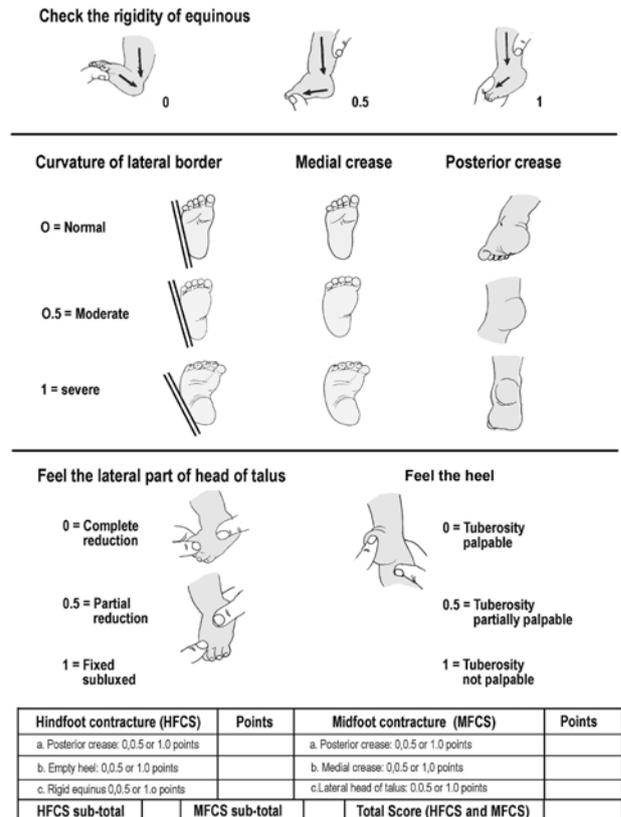


Figure 1 - The Pirani score.

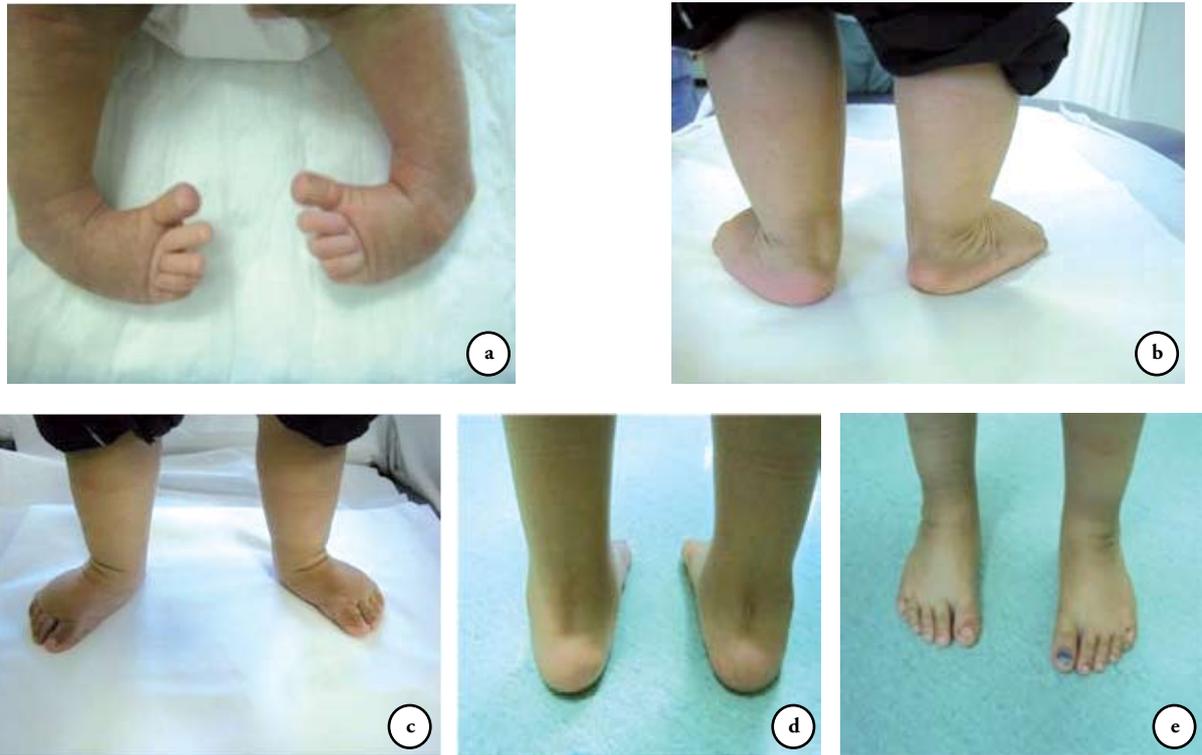


Figure 2 - Clinical photographs showing a) the club feet of a 1.5 month-old baby prior to Ponseti treatment. b & c) The same patient is shown 12 months after Ponseti treatment, which consisted of 5 casts and tenotomy. d) Follow up posterior and e) anterior view photographs show the patient at 3 years.

less than 10 degrees. Tenotomies were performed in all but one patient (2 feet) (0.9%), as the parent refused tenotomy. This patient required 9 casts, and needed no further treatment at 3 years follow up. Thirty-four patients (48 feet) (21.1%) relapsed. Among the 169 patients (227 feet) who had full correction, 64 patients (84 feet) (37%) were not compliant with the Dennis-Brown Brace (DBB). Two patients (2 feet) (0.9%) were not using the brace during the first 3 months (full time) and required recasting and second tenotomy. Sixty-two patients (82 feet) (36.1%) were using the DBB on and off at nighttime. Among these patients, 18 patients (28 feet) (12.3%) required recasting and second tenotomy, 5 patients (7 feet) (3.1%) required Achilles' tendon lengthening with posterior release (PR), 4 patients (4 feet) (1.8%) required posteromedial release (PMR), and 35 patients (43 feet) (19%) needed no further treatment. These patients who needed no further treatment had idiopathic clubfeet with average Pirani score of 5.7/6 (range 5.5-6) pre casting. Among the 105 patients (143 feet) (63%) who were compliant with DBB, 3 patients (5 feet) (2.2%) required TAL with PR, 2 patients (2 feet) (0.9%) required tibialis anterior transfer (TAT)

at age 4 years due to a dynamic supination deformity, and 100 patients (136 feet) (59.9%) showed no relapse and needed no further treatment. At the last follow up period, flexible metatarsus adductus was seen in 36 (15.9%) feet. Minor complications were noted in 14 patients (18 feet) (7.9%). Six patients (6 feet) (2.6%) noted one or more episodes of cast slippage, and 8 patients (12 feet) (5.3%) were noted to have minor skin irritations.

Discussion. The aim of treatment for idiopathic clubfoot is to achieve a foot with a nearly normal appearance, painless, and good function. Different methods of nonoperative treatment have been described. Kite⁹ recommended manipulating the feet by abducting the forefoot against pressure at the calcaneocuboid joint. Ponseti⁵ called this maneuver "Kite's error" because it ignores correction of the hindfoot varus and internal rotation. Laaveg and Ponseti² reported satisfactory functional results in 89% of feet treated by the Ponseti technique. Even with follow up of as long as 30 years, excellent or good functional outcomes remain in 78% of patients, compared with 85% of control patients without

clubfoot.¹⁰ The Ponseti technique avoids unnecessary surgeries that may have long term complications including skin necrosis, infection, recurrence, pain, stiffness, overcorrection, and undercorrection.¹¹⁻¹⁴

Using the Ponseti technique, we obtained initial full correction in 96.6% of cases. This result is similar to others using the same technique, with Herzenberg et al¹⁵ reporting 100% initial correction, Morcuende et al¹⁶ 98%, Tindall et al¹⁷ 98%, Colburn and Williams¹⁸ 95%, and Abdelgawad et al¹⁹ 93%. Among the 175 patients, 160 patients (91.4%) were less than 6 months old. In all our 6 early failure cases but one, age at initial visit was 6 months or less. Three cases were idiopathic, while the others were associated with talocalcaneal coalition and arthrogryposis. These results are not similar to those of Abdelgawad et al¹⁹ who reported that age at initial visit of greater than 6 months was associated with a higher incidence of early failure. All our early failure cases required a formal PMR. Morcuende et al¹⁶ reported a total of 256 clubfeet (treated by Ponseti technique) in which correction was successful in 98%, 11% recurrence rate, 2.5% required extensive corrective surgery, and 2.5% needed TAT. Herzenberg et al¹⁵ reported that 3% of clubfeet treated with the Ponseti technique required PMR. A more recent study by Pittner et al²⁰ reported the efficacy of the Ponseti technique in 95%, and only 5% required a more extensive PMR.

Our results confirmed the efficacy of the Ponseti technique of manipulation and serial casting. Overall, we obtained acceptable correction with serial casting alone in 0.9%, of feet and with percutaneous tenotomy in 99.1% of feet. Thacker et al²¹ reported a significant difference in compliant versus noncompliant patients treated with the Ponseti technique. We defined noncompliance as a failure to wear the DBB for 23 hours a day in the first 3 months and subsequently at night-time.⁵ Patients who tolerated bracing had lower recurrence rates and underwent less surgery. Although Ponseti¹⁶ recommends using DBB for 3-4 years, most parents (83%) face resistance from the child to wear the DBB and sleep with it by the end age of 2 years. By educating the parents and encouraging them, patient compliance will improve and thus the recurrence rate will be less.

This paper has obvious limitations. This is a retrospective study that needs long term follow up to evaluate the recurrence. More research to study the factors that improve compliance is required in the future.

In conclusion, our study supports previous reports on the effectiveness of the Ponseti technique of manipulation and casting in decreasing the number of surgical interventions needed for correction of clubfoot

deformity. Long-term follow up is required to further evaluate recurrences.

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