

## Early result of Ponseti management of congenital clubfoot

Vo Quang Dinh Nam, Huynh Manh Nhi, Phan Van Tiep

Hospital for Traumatology and Orthopaedics, Hochiminh City, Vietnam

**Abstract :** **[Purpose]** To evaluate early result and challenges in treating congenital clubfoot by Ponseti method.

**[Study design]** Case series

**[Method]** All congenital clubfeet, idiopathic and pathological, treated according to Ponseti method at the Hospital for Traumatology and Orthopaedics between Feb 2004 and Feb 2007 were recorded. They were classified and evaluated during casting according to Diméglio's scale.

**[Results]** 112 clubfeet of 78 patients ( $\leq 6$  months of age or  $>6$  months of age with adduction & equinus after previous treatment) were treated according to Ponseti method. The successful results of manipulating and casting were in 106 (94.6%) clubfeet; number of casts was 1-10, ave. 4 casts. The complications were slippage of cast, most popular in 19 (16.9%) feet and rocker-bottom, most challenged in 2 (1.8%) feet. 77 clubfeet of 54 patients were followed up of 3-30 months. The early relapses were in 11 (14.3%) feet; all had additional manipulation & casting.

**[Conclusion]** Manipulating and casting according to Ponseti method were effective. Span of time to correct the deformity was short. The complications were due to casting technique.

### Introduction

Congenital idiopathic talipes equinovarus, also known as clubfoot, is a well-recognized foot deformity estimated to affect approximately 1 in 1,000 live births. Although anapathology and treatment of clubfoot are still controversial<sup>1),8)</sup>, most orthopedists agree that the initial treatment should be nonsurgical and started soon after birth<sup>6)</sup>.

In Vietnam, the conservative treatment is with the french functional method or manipulation and serial casting. The Ponseti method is becoming popular recently but no result is reported.

This study is evaluating the efficacy and the challenges of the Ponseti method for the correction of congenital clubfoot while applied in Vietnam. Because of short-term follow-ups, here is the result of the initial correcting period and the bracing period to prevent relapses.

### Methods

All congenital clubfeet, idiopathic and pathological, treated according to Ponseti method at the Hospital for Traumatology and Orthopaedics between Feb 2004 and Feb 2007 were recorded. The method was applied for the children  $\leq 6$  months of age or the children  $>6$  months of age

**Key words :** clubfoot, Ponseti method, percutaneous tendoachilles tenotomy, foot-abduction brace, rocker-bottom

**Correspondence :** Vo Quang Dinh Nam

**Address :** Hospital for Traumatology and Orthopaedics 929 Tran Hung Dao St., Dist. 5, Hochiminh City, Vietnam

**Phone :** 848 39235821 (ext. 116) **Fax :** 848 39235789

**E-mail :** namvqd@hotmail.com



**Fig. 1.**  
Right clubfoot after 5 casts. Rocker-bottom with forced flexion on lateral Xray. Percutaneous tendoachilles tenotomy was indicated.



**Fig. 2.** Modified Denis Brown brace. The shoes can be rotated polyaxially.



**Fig. 3.** Bivalved fiberglass cast with Velcro closure.

having previous conservative treatment but remaining adducted and equinus.

The treatment protocol has some features as following : 1) gentle manipulation for 2-3 minutes before casting ; 2) the hydrophilic padding cotton 5-7.5 cm and the plaster cast 5-7.5 cm are used ; 3) casts are changed every 5-9days. The last cast is for 3-4 weeks if percutaneous tendoachilles tenotomy is carried out ; 4) cast is removed at home as instruction before coming for the next cast ; 5) percutaneous tendoachilles tenotomy is indicated in case of dorsal flexion <math>10^{\circ}</math> or rocker-bottom with forced flexion (detected clinically or by lateral Xray-Fig.1) or recurrent cast slippage ; 6) Tenotomy technique by local or general anesthesia : an 0.5 cm longitudinal skin incision 2 cm proximal to calcaneus, closely medial to tendon with the blade No.11.

The tendon is cut by tip of the blade in mediolateral, anteroposterior direction ; 7) Abduction brace after full correction : modified Denis Brown brace (Fig. 2) or bivalved fiberglass cast with Velcro closures (Fig.3) is used at full-time for 2-3 months and nighttime up to 2 years of age.

Every patient is recorded by a blank charter. They were classified and evaluated during casting according to Diméglio's scale. The final cast is considered as successful if all components of the deformity (cavus, adductus, varus and equinus) are corrected completely (excellent) or are not more than 1 point according to Diméglio's scale (acceptable). Cast complications include erythema, slippage of the cast, skin pressure, and rocker-bottom. A relapse is defined as the reappearance of any of the components of the

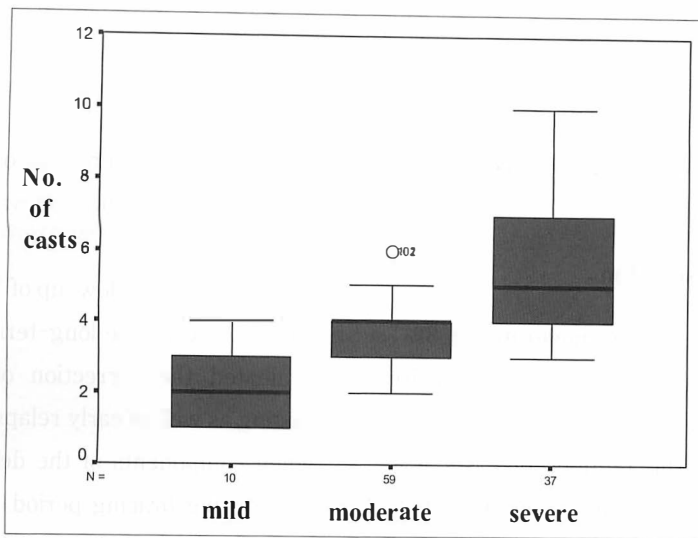


Fig. 4. No. of casts associated significantly with the severity ( $p < 0.01$ ). Mild grade needs 2 casts, moderate 4, and severe 5 averagely.

deformity and need to be managed if the component is  $\geq 2$  point of Diméglio's scale.

In statistic analysis, the variables evaluated are age of the patient at first visit, form of clubfoot (idiopathic or pathological), severity, cavus, number of casts, need for percutaneous tendoachilles tenotomy, Kind of foot-abduction brace. These variables were analyzed in relation to result of the final cast and relapses by t test, Fisher test and odds ratios.

### Results

112 clubfeet of 78 children were treated according to Ponseti method. The patients were between new-born and 18 months of age at initial casting. 59 patients (75.6%) were male. 43.6% of patients was bilateral clubfeet. 69 patients (88.5%) were idiopathic. 9 patients with pathological clubfeet include 3 with constriction band, 2 with limbs' malformation (1 having other organs' malformation), 1 with myelomeningocele, 1 with fibula adysplasia, 2 with lowerlimbs' hypodyslasia. According to Diméglio's scale, 59 clubfeet (52.7%) were moderate and 40 clubfeet (35.7%) were severe, the rest was 10 clubfeet (8.9%) mild and 3 clubfeet (2.7%) very severe.

Table 1. Factors Associated With Early Relapse

	P Value
Severity	0.46
Kind of brace	0.47

Number of casts was 1-10, ave. 4 casts and 41.5% of clubfeet had 4 casts. Fig. 4 showed the association between the severity and number of casts ( $p < 0.001 < 0.01$ ). Percutaneous tendoachilles tenotomy was performed in 79 clubfeet (70.5%). The successful results of manipulating and casting were in 106 feet (94.6%) with 76.8% excellent and 17.9% acceptable. The complications were erythema in 5 feet (4.5%), skin pressure in 2 feet (1.8%), slippage of cast in 19 feet (16.9%) including 6 feet (3 feet with erythema) operated and rocker-bottom in 2 feet (1.8%) including a foot with percutaneous tendoachilles tenotomy.

77 clubfeet of 54 patients were followed up of 3-30 months, ave. 10 months. The modified Denis Brown brace was in 30 clubfeet (40%) and the bivalved fiberglass cast was in 44 clubfeet (51.9%). The early relapse was in 11 clubfeet (14.3%) and all had additional manipulation & casting. The early relapse was not significantly

related to severity of clubfoot and kind of abduction brace (Table 1).

### Discussion

Most of our clubfeet were moderate (55.3%) and severe (30.3%); these scales of severity could be corrected successfully as view of Diméglio<sup>2)</sup>. Although the number of casts was found related to the severity at presentation, 41% of the clubfeet needed only 4 casts; that was favourable for the treatment because many patients lived far from our hospital and the time for correction of the casting was much shorter than the functional method. The percutaneous tendoachilles tenotomy was needed in 70.5% of clubfeet; lesser than Morcuende's clubfeet (86%)<sup>5),6)</sup>. The successful result 94.6% of our series was encouraged as compared to Morcuende's successful result >95% for idiopathic clubfeet; 6 however, our series included both idiopathic and pathological clubfeet.

Slippage of cast was the most popular complication (16.9%) and was also the challenge we experienced. All 6 surgical clubfeet had the slippage and the slippage caused erythema in 3 clubfeet. We recognized that the complications were due to deficient manipulating and casting technique as aggressive gesture making the child crying, thick cotton pad, heavy cast, bad molding. With the time of learning curve, our technique was improved and complications decreased. Among Morcuende's 157 patients, 8% had a cast complication, including erythema, slight swelling of the toes, or slippage of cast and all these complication were attributed to casting technique<sup>6)</sup>. Recently, we used Tincture de Benzoin in some cases of slippage and erythema. Rocker-bottom was in 2 feet due to aggressive foot dorsal flexing without tenotomy; one of

these 2 feet had percutaneous tenotomy at final casting. This complication was warned by Ponseti in 1963<sup>7)</sup>.

Although the follow-up of 3-30 months was not enough to evaluate long-term result, we initially evaluated the correction of manipulating and casting as well as early relapse. Early relapse was when components of the deformity were recurrent during bracing period. 14% of our clubfeet was relapsed and all were recorrected by casting and some had additional percutaneous tendoachilles tenotomy. In Morcuende's series, relapses were 10% after initially successful treatment. These relapses were not significantly related to age at presentation, previous unsuccessful treatment, or the number of casts; they were associated with noncompliance with the foot-abduction brace<sup>6)</sup>. Dobbs et al<sup>3)</sup> said that noncompliance and the educational level of the parent are significant risk factors for the recurrent of clubfoot deformity after correction with the Ponseti method. According to Haft et al<sup>4)</sup>, 51 patient with a total of 73 clubfeet treated by the Ponseti technique were followed prospectively for a minimum of 2 years from the start of treatment. Recurrence was classified as minor, defined as requiring a tendontransfer or an Achilles tendon lenthening, or major, defined as requiring a full posterior or posteromedial surgical release. The compliance with the bracing protocol is crucial to avoid recurrence and no significant relationships were found between recurrence and the severity at presentation, the time of presentation, the number of casts needed to obtain correction, ethnicity, or a family history of clubfoot. We also recognized no association between early relapse and the severity or the kind of abduction brace (modified Denis Brown brace or bivalved fiberglass cast).

## Conclusion

Manipulating and casting according to Ponseti method were effective. Span of time to correct the deformity was short. The complications were due to deficient casting technique. Relapses and long-term result need to be evaluated with more data.

## Acknowledgements

Thank Dr. Hidehiko Kawabata for his review before submitting the manuscript to The Journal of The Japanese Paediatric Orthopaedic Association.

## References

- 1) Cummings RJ, Davidson RS, Armstrong PF et al : Congenital clubfoot. Instr Course Lect 51 : 385-400, 2002.
- 2) Diméglio A et Canavese F : Le pied bot varus équin : regard sur le monde actuel. Dans Le Pied de l'enfant et de l'adolescent (Diméglio et al., ed), Masson, Paris, 157-163, 1998.
- 3) Dobbs MB, Rudzki JR, Purcell DB et al : Factors predictive of outcome after use of the Ponseti method for the treatment of idiopathic clubfeet. J Bone Joint Surg Am 86 : 22-27, 2004.
- 4) Haft G, Walker C, Crawford H : Early clubfoot recurrence after use of the Ponseti method in a New Zealand population. J Bone Joint Surg Am 89 : 487-493, 2007.
- 5) Morcuende JA, Dietz FR, Ponseti IV et al : Plaster cast treatment of clubfoot : the Ponseti method of manipulation and casting. J Pediatr Orthop 3 : 161-167, 1994.
- 6) Morcuende JA, Dolan LA, Dietz FR et al : Radical reduction in the rate of the extensive corrective surgery for clubfoot using the ponseti method. Pediatrics 113 : 376-380, 2004.
- 7) Ponseti IV, Smoley EN : Congenital club foot : the results of treatment. J Bone Joint Surg Am 45 : 261-275, 1963.
- 8) Seringe R, Atia R : Pied bot varus équin congénital idiopatique : résultats du traitement "fonctionnel". Rev Chir Orthop 76 : 490-501, 1990.