

# Clubfeet and Constriction Band Syndrome - Case Report

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## Research

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# Abstract

**Background:** Clubfeet and constriction band syndrome is very rare nonidiopathic condition. Treatment is often difficult and the recurrence deformity rate is high. The purpose of this study was to assess the effectiveness of Ponseti method in treatment of congenital constriction band syndrome accompanied clubfoot deformity and lymphedema.

**Case presentation:** We are presenting an interesting case of bilateral clubfeet and congenital circumferential constriction band syndrome in lower limb. Ponseti method of correcting the congenital clubfoot deformity was applied. Constriction band release is accomplished by two stage completely excising the fibrous band and multiple two stage Z-plasties on the right calf.

**Conclusion:** The results of this study indicate that the Ponseti method of gentle, systematic manipulation and weekly cast changes is effective treatment of nonidiopathic clubfoot distal to congenital amniotic constriction band.

## Introduction

The constriction amniotic band syndrome (CABS) is a collection of fetal malformations associated with fibrous bands that appear to entangle various fetal parts in utero, leading to deformation malformation, or disruption(1, 2). The amniotic band syndrome occurs sporadically and the incidence is one case per around 15,000 live births.

It is characterized with compression in the soft tissue usually involving the deep fascia surrounding the leg at the time of birth (3, 4). The fact that there are many theories that attempt to explain the etiology of amniotic band syndrome suggest that etiology of this condition remains unknown (1).

An associated clubfoot deformity has been reported to occur in between 12% and 56% of patients with CABS (4, 5). The involved foot may occur below an ipsilateral band, or appear in a limb without a proximal band. Some authors have found the clubfeet that are associated with this syndrome to be rigid and resistant to nonoperative management, and the majority of patients in a number of early series were treated by extensive surgical release (5–7)

Clubfoot combined with circumferential amniotic band syndrome is distinguished from other types of congenital deformity because of risk of multiply relapses (6, 8, 9). According to Ponseti under ultrasound examination a clubfoot is rarely detected before the 16th week of gestation (10). When a clubfoot deformity is suspected during prenatal ultrasound screening this should lead to more thorough search for co-morbidity (11).

This case is reported because of its extreme rarity of bilateral congenital constriction band syndrome accompanied clubfoot deformity and lymphedema. The purpose of the present study was to evaluate the results of the Ponseti method for the treatment of clubfoot associated with constriction band syndrome.

## Case Presentation

A male child of Caucasian origin, was brought to our hospital at the age of 5 days with circumferential congenital constriction rings just above of the ankle joint, and severe clubfeet. The pediatric examination revealed no other abnormality in upper extremities or other organs. Pregnancy was uneventful, but during a routine ultrasound examination at 18 weeks of gestation, the gynecologist noticed bilateral clubfoot deformities and informed the parents (Fig. 1). The child was born by a normal vaginal delivery at full term with cephalic presentation. There was no family history of congenital anomalies

On inspection, both feet had inversion at the subtalar joint, equinus and varus in the ankle joint, adduction of the forefoot, pronation of the forefoot in relation to the ankle joint, cavus (excavatum), internal rotation of the crural region. (Fig. 2)

The right foot : a constriction circumferential ring, type II in Patterson classification, was located about 4.0 cm above ankle joint without neurologic deficit, but with dorsal lymphedema. The toes of the right foot were hypoplastic. There was also a severe clubfoot deformity grade 4 according to Dimeglio classification with marked medio-tarsal crease.

The left foot: a circumferential constriction band, type II in Patterson classification, was located above 3.8 cm the ankle but without lymphedema. The clubfoot deformity was grade 4 according to Dimeglio.

There wasn't noticed any limb-length discrepancy.

Clubfeet were corrected with Ponseti method as a safe and effective procedure. During treatment of clubfoot 3 phase were essential: reduction of deformation (2 months), consolidation of obtained results (4 months) and manage the risk for relaps(3 months).

A long-leg-cast was applied with knee flexed 90°. The cast was changed every week with gradual correction of the deformity according to Ponseti protocol. Cavus, adductus and varus was fully corrected but dorsiflexion was limited for 20 degrees bilaterally so the tenotomy of Achilles tendon was indicated. Because of lymphedema from amniotic band syndrome on the right foot, we decided to cut the constriction bands in order to releasing the tourniquet-like effect. Percutaneous Achilles tenotomy was performed bilaterally and three longitudinal incision were made through the constriction band, on the right foot. Of course, later reconstruction procedure was necessary. There was no bleeding complications following percutaneous tendo achilles tenotomy (Fig. 3B). The post-tenotomy casting remained for 3 weeks with changing the cast casts every 10 days.

After Ponseti procedure the foot abduction brace (FAB) protocol was applied to maintain the correction: the brace protocol included 23 hours a day at 70° of external rotation for three months, then reduced to 18 hours a day and then removed gradually, one hour a day until a use of 12 hours a day. After walking age, the brace was worn at night (Fig. 3C).

The patient was followed until 2 years old, and there was no relapse of the deformity.

A two-stage circumference excising of the congenital constriction band was done by plastic surgeons, with a three months interval between stages (Fig. 5). The first stage of surgery was done at age of 13 months and 3 weeks, and the second stage three months later. There was no wound complication. The lymphedema was withdrawn.

## Discussion

In our case clubfeet associated with constriction bands were successfully treated with Ponseti method and multiple Z plasties. Tada et al reviewed a series of 83 patients with congenital annular constricting bands and found 19 children with clubfeet (4). Askins and Ger reported a 49% association of congenital band with clubfeet (12). Most of the clubfeet associated with CABS that have been reported in the literature to date have been managed by extensive soft tissue release. Auington et al assessed the outcome of treatment in 18 patients with clubfeet distal to a congenital band, the majority of which were treated using extensive surgical release(13). Syndromic clubfeet have been reported to be resistant to nonoperative management, and complete releases are routinely required. In patients with constriction band syndrome, Hennigan and Kuo (6) noted 62% good results. The results of surgery have often been inconsistent.

Recently, because of the good outcomes with idiopathic clubfeet, the Ponseti method has been used for non-idiopathic cases, also. Advantage of the Ponseti method are: High quality reduction of clubfoot with the restoration of a sub-normal anatomy, low cost and small displeasing worry for the parents. Fortunately the Ponseti strategy in our case worked well and no relapse.

Carpiaux et al reported that ipsilateral banding did not affect the effectiveness of the Ponseti technique in the treatment of clubfeet associated with CABS (14). Zionts et al also reported that all of the clubfeet in their series were corrected by a series of manipulation and cast applications using the Ponseti technique (8).

But, Jackson et al concluded that clubfoot associated with constriction band required more casts to achieve an acceptable correction and had an increased risk of deformity recurrence compared with subjects with isolated clubfoot (15).

Constriction circumferential band on the right calf in our case was operated by plastic surgeons in two stages, during the first stage anterior part of constriction band was release and in the second stage posterior part.

A higher number of cases and a longer follow-up period is needed to evaluate the long-term efficacy of Ponseti method in constriction band syndrome associated clubfoot.

## Conclusion

Clubfeet associated with constriction rings syndrome are challenging deformities. Relapse rates (recurrence of a previously corrected deformity) are high and should be taken into consideration. The results of this study indicate that the Ponseti method of casting is an effective treatment of clubfoot in newborns with constriction rings syndrome.

## **Declarations**

### **Ethics approval and consent to participate**

The authors hereby confirm that the study was conducted with ethical approval and the patient's parents gave their consent to participate.

### **Consent for publication**

The authors have the consent of the patient's parents to publish the data.

### **Availability of data and materials**

All data generated or analysed during this study are included in this published article.

### **Competing interests**

The authors declare that they have no competing interests.

### **Funding**

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### **Authors' contributions**

D.B. was directly involved in the treatment of the patient and wrote the manuscript.

B.SH. helped during the treatment and wrote the discussion section.

C.B. supervised the whole treatment and writing process.

All authors read and approved the final manuscript.

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## Figures



**Figure 1**

Ultrasound two and three dimensional images of clubfoot at 18 week of gestation



**Figure 2**

Severe bilateral clubfoot in a newborn at the day of birth and at the age of 5 days with constriction rings. Constriction rings in the calf above to the ankle joint are circumferential and responsible for foot and ankle lymphedema on the right side.



A

B

C

### Figure 3

Clubfeet were corrected with Ponseti method using plaster of Paris in our case because of the possibility of more precisely moulding in comparison to fiberglass (A). Because full dorsiflexion was not possible with stretching alone, a percutaneous Achilles tenotomy was performed (B). The foot abduction brace (FAB) was crucial to maintain correction and preventing relapse (C)



A.

B.

C.

### Figure 4

Preoperative view at age of 5.5 months after Ponseti procedure. Deformation and lymphedema improved (A). Postoperative view after excision and repair in two stage of constriction band. Complete dissection in two stages of the fibrous band improves significantly lymphedema. The last follow up at age of 2 years, there is no sign of relapse and the lymphedema is recovered.

Image not available with this version

### Figure 5

Figure 5

