

# Modern approaches in the treatment of children under three years of age with congenital clubfoot using the Ponsetí method

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**Abstract:** *Despite modern advances in paediatric traumatology and orthopaedics in the treatment of patients with foot deformities, conservative and surgical strategies of cure are nevertheless considered unsuccessful, to a giant extent if the problem is a recurrent or justified congenital ailment of the central or peripheral apprehensive system. For the therapy of children with congenital clubfoot we have used a huge range of treatments, including purposeful techniques (corrective massage, TPT, carrying functional tires), fixation methods (bandaging, staged plaster bandages), physiotherapy (electrostimulation, hydrotherapy, UHF, ultrasound, electrophoresis, etc.). Specialized remedy included: orthopaedic (wearing orthopaedic footwear with inlays, shafts, bandages made of thermoplastic), conservative and surgical treatment. Analysis of the bought remedy effects in distinct age groups showed that the major undertaking of treatment and its success depends on early restoration of anatomical relations in the joint. Thus, in teenagers under one-year-old, appropriate diagnostics and software of atraumatic functional methods of remedy primarily based on Ponset approach allowed achieving good results with a significant discount in the number of plaster bandages and accordingly decreasing the cure duration in universal to 2 months. The find out about of the experience of cure of congenital clubfoot based totally on its cloth showed that the use of a unique cure approach relies upon on the assessment of the severity of foot deformation. The chosen treatment systems need to be intensive and consistent, beginning from the early duration after birth, when the foot deformity is cellular and bendy to correction. The new technique of surgical treatment, change of achillotomys in accordance to the Ponset method, allowed us to get suitable beauty result barring lowering the effectivity of the surgical intervention. Another benefit of this technique reduces the length of the operation and reduces soft tissue trauma in the Achilles tendon area.*

**Keywords:** *clubfoot, gypsum bandage, relapse, orthopedic regime, children born.*

**Introduction:** Despite modern achievements in paediatric traumatology and orthopaedics in the treatment of patients with foot deformities, conservative and surgical methods of treatment are still considered unsuccessful, to a large extent, if the problem is a recurrent or justified congenital disease of the central or peripheral nervous system. One of the most common congenital orthopaedic diseases in children is the congenital clubfoot, which is characterized by the multiplane deformity. Numerous conservative and surgical methods of correction of the congenital clubfoot have been proposed; however, with the growth of children, there is a recurrence of the disease in patients with a severe degree of disease, and some children develop other deformities (flatfoot, toe deformities) of the foot. Recurrences range from 12% to 36% [1,2,17].

**Research material and methods:** In traumatology and orthopaedics department of Andijan regional children's hospital, 58 children with congenital clubfoot were treated from 2015 to 2019. There were 40 boys (69%) and 18 girls (31%). The age of children under one year - 45 (77,6%), from one to three years - 13 (22,4%).

Bilateral clubfoot was observed in 34 (58.6%) and one-sided clubfoot in 24 (41.4%). Left-sided and right-sided were equally diagnosed in 12 (20.7%). Children were observed both in the treatment and rehabilitation period, i.e. outpatient conditions.

Table No. 1.: Distribution of children by localization of deformity.

Deformation containment	Frequency	Percentage
Bilateral defeat	34	58,6
Right-handed defeat	12	20,7
Left-handed defeat	12	20,7
Total	58	100,0

For the treatment of children with congenital clubfoot, we used a wide range of therapeutic methods including functional methods (healing massage, TPT, wearing of tires), fixation methods (bandaging, application of stage plaster bandages), physiotherapeutic treatment (electrostimulation, hydrotherapy, electrophoresis, paraffin application, etc.). Specialized treatment included: orthopaedic footwear (wearing orthopaedic shoes with a pronator and a rigid back, breeches, plastic gypsum bandages), medication therapy (vitamin D, calcium and multivitamin preparations) and surgical treatment of Ponsetí modifications.

**Results:** Achillotomy was performed in 50 (90%) patients. Eight patients did not have to undergo an achillotomy because they had a mild deformity. Good results were obtained in 50 patients and were considered as such in the presence of a stable, correct foot shape after the deformation had been corrected. 5 children had a partial loss of correction after 6-8 months, which was corrected by stage plaster bandages. In 3 children, a relapse of deformities was observed and stabilizing operations were performed. In order to estimate the nearest results of treatment of children with this congenital pathology, to choose the method of treatment and to substantiate the surgical treatment of relapses aimed at ensuring the elimination of both anatomical and aesthetic defects of development in clubfoot, reduction of hospital treatment

terms, early activation of patients and to provide conditions for social rehabilitation, the method of foot deformation severity estimation in clubfoot according to Caterall-Piran scale was introduced[18].

The use of this evaluation method allows improving the results of a given defect, fixing the data and comparing the obtained results with the previous ones.

The analysis of the obtained results of treatment in different age groups showed that the main task of treatment and its success depends on the early recovery of anatomical relations in the joint. Thus, in children up to one-year-old, timely diagnostics and application of atraumatic functional methods of therapy based on Ponset method allowed achieving good results with a significant reduction in the number of plaster bandages and thereby reducing the treatment period in general to 2 months [9].

**Discussion:** A study of the experience of treatment of congenital clubfoot based on its material has shown that the use of a particular treatment method depends on the assessment of the severity of foot deformation. The chosen treatment tactics should be intensive and consistent, starting from the early post-birth period, when the foot deformity is mobile and adaptable to correction.

Some authors up to the age of one-month use bandage according to Fink-Ettingin-Zelenin (Sviridova O.P., Lukash Yu. 2005) and other modifications of soft bandages (Chugui E.V., 2009). The "Francis" method based on the functional treatment of congenital clubfoot consists in the use of long corrective manipulations and foot exercises aimed at tissue stretching and correction without additional fixation (Benshanel H., Jehanno P., DelabyJ. P., et al., 2006; dimeglioA., Canavese F., 2012). We started the treatment after the baby was discharged from the maternity hospital, with a gentle massage. Parents were taught how to do it. For younger children (from two weeks of age) without other pathologies, the treatment began by applying corrective stage plaster bandages on the lower extremities from the fingertips to the upper third of the thigh [8]. Before the plaster cast is applied, a corrective manipulation of the middle and posterior parts of the foot is performed for 3-4 minutes to bring the foot out of the inversion position. During the plaster cast, the assistant should hold two or three fingers of the child's foot by the fingers in the rare position and apply pressure on the head of the talus [2].



Fig. 1. The technique of plaster bandage application.

During the period of correction of the primary deformation, we used plastic (polymer) plaster: Kangdagast, Scotchcast, Turbocast, etc. The composition of polymer gypsum is fiberglass, polymer mesh impregnated with polyurethane resin [9]. It is well activated by water, during the polymerization reaction, the distance between the fibers does not change and a "breathing" dressing is formed through which air can freely penetrate. It stretches in 6 directions, so it is easy to simulate the dressing for anybody contours, and this improves the degree of immobilization. Due to its mesh structure, the polymer bandage is lighter than gypsum bandage 2-5 times. The resulting polymer gypsum base can be used to create a removable orthosis as the deformation is corrected [1].



Fig.2. Patient M. Patient M., 6 months. Congenital right side clubfoot. Correcting plaster bandage after achillotomy. Front view.

The components of the clubfoot are correlated in stages. In the first stage, the cavus component is corrected, and in the second stage, varus and adduction are corrected.

The number of stages of gypsum dressing depends on the severity of the deformation. During the stage gypsum plastering, the change of gypsum dressing was performed on average once during 5-7 days (Fig. 4).

In the last stage, the equinus position of the foot remained and it was correlated with subcutaneous transection of the Achilles tendon (Achillotomy). Tenotomy, as the second stage of treatment, is required in 70-85.5% of cases (MorcuendeJ.A., AbbasiD., DolanL.A., 2005; Terrazas-Lavargueg., morguendeJ.A., 2007).

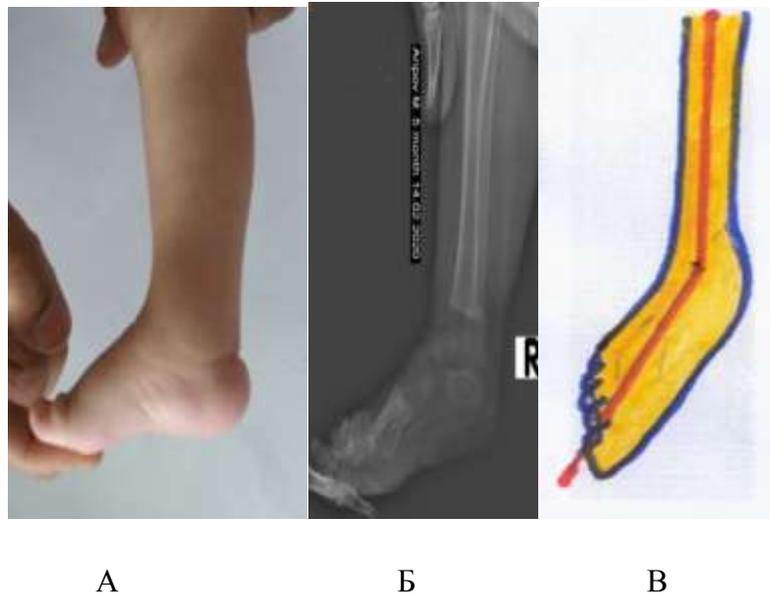


Fig. 3. Equinus position of the right foot in passive back flexure. A - Patient M. 6 months. Congenital clubfoot of the right foot. B is the same patient's X-ray. C is a schematic representation of the same patient. Condition to achillotomy. The view from the medial side.

Achillotomy's been in our department since 2010. For the first 2-3 years, we performed an achillotomy under general anesthesia; then we switched to local anesthesia. During the achillotomy, the operating orthopedist has to be careful and calculate so as not to damage the heel bone cartilage. Because of this, achillotomy is performed by moving 1-1.5 cm above the place where the Achilles tendon is attached to the heel hump.

After careful treatment of the operating field with 3% iodine solution and ethyl alcohol solution (96 degrees), from the place where the Achilles tendon is attached to the heel bone, leaving 1.0-1.5 cm above the heel bone, 2 ml-1% Solutionovocaini is injected with a needle size of 1.2x40mm.-18 G (with a needle size of 50.0 ml syringe). At this time of manipulation, the assistant holds the foot in the position of maximum rear flexion. Without pulling the needle out of the wound, waiting for 2 minutes, the Achilles tendon is cut with the same needle with horizontal movements.



Fig. 4. Patient M. for 6 months. Congenital right side clubfoot. Subcutaneous dissection of the right Achilles tendon (Achillotomy).

When Achilles tendon is completely dissected, a specific "click" is heard and the rear flexion increases sharply by 20-25 degrees. The wound is not sutured, as the procedure takes place without incision, the size of the wound is approximately 1.2-2 mm [1, 5].

A pressure, sterile cloth is applied to the wound. After the operation, a circular, corrective plaster bandage is applied in the intensive care unit, from the fingertips to the upper third of the thigh in the rear bend position (80-85 degrees) to prevent recurrence. The latter was retained in the child for 3-4 weeks. After removal of the plaster bandage is appointed wearing shafts and physiotherapy procedures.

In case of non-compliance with the orthopedic regime and recommendations of the attending physician during treatment and rehabilitation, leads to a relapse of clubfoot. It is very important to explain to parents that compliance with all recommendations and cooperation with the attending physician is the key to the success of their child's treatment. The correct application of special orthopaedic shoes with pronator is also important, and they are prescribed to children when they start walking on their own. A number of authors abroad (bensahelH., Bieneyneb., JehannoP., 2007) and in our country (Kozhevnikov 2008; Vvedensky P.S. Bogosyan A.B. 2010) offer early or even surgical correction of clubfoot in the first months or days from birth. The authors substantiate their opinion by the fact that with fixed equinus, ram bone flattening occurs already in the first weeks of life. However, according to other authors, surgical intervention in the first 3 months of life further leads to excessive formation of scar tissue and a large number of relapses (ThanP., KustosT., 1998, etc.).

**Result:** A new method of surgical treatment, the modification of achillotomys by the method of Ponset, allowed us to get an excellent cosmetic result, without reducing the effectiveness of the surgical intervention. Another advantage of this technique reduces the duration of surgery and reduces soft tissue trauma in the Achilles tendon area.

### Conclusions:

1. Treatment of children with congenital clubfoot should be started from the first days after the discharge of the child from the maternity complex.
2. To prevent relapse, it is advisable to carry out rehabilitation treatment and observance of orthopedic regime up to 4-5 years of age.
3. Compliance with the orthopedic regime during treatment and outpatient care lead to good results.

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