

# REHABILITATION OF FEATURES IN INFANTS WITH CONGENITAL HIP DISLOCATION AND THE STAGES OF CONSERVATIVE TREATMENT

*Voloshin S.Y., Belousova E.A.*

FSBI “Scientific and Research Institute for Children’s Orthopedics n. a. G.I. Turner”,  
Ministry of Health of the Russian Federation, St. Petersburg

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Congenital dislocation of the hip is one of the most common and difficult to initially diagnose diseases in children, often resulting in disabilities. Among congenital orthopedic diseases, congenital dislocation of the hip is one of the most serious. It is important to treat the disease as soon as possible because the most complete restoration of anatomical structures and functions of the hip joint in children is easier to achieve with early diagnosis and timely comprehensive treatment. Rehabilitation of children in the first year of life should be initiated early and be systematic, comprehensive, and differentiated. The rehabilitation stages of conservative treatment include wearing of functional tires, gymnastics, massage, physiotherapy, and therapeutic swimming. This approach prevents disease progression and development of early and late complications, does not violate static–dynamic functions, and does not delay verticalization.

**Keywords:** congenital hip dislocation, rehabilitation, children, infancy.

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## Introduction

Congenital hip dislocation is one of the most prevalent congenital defects of the musculoskeletal system in children, and it occurs in 3–4 cases per 1000 normal deliveries [1, 2, 3, 4].

The urgency of this problem is because the complete restoration of anatomical structures and functions of the hip joint in children is only possible if early diagnosis and timely treatment occurs at the stage of infancy. [5, 6, 7].

Complete abandonment of one-stage closed reduction and several cast changes as well as the use of prepositioned functional braces have prevented complications, such as post-repositioning ischemic necrosis of the femoral head in approximately 98% of cases [7].

In the absence of adequate treatment, anatomical, functional, and trophic diseases of the hip joint components progress as the child grows and lead to further severe structural changes in the joint. This leads to the impaired functioning of support and movement; in addition, at the same time, there are changes in pelvis position, spine curvature, and development of osteochondrosis and coxarthrosis, which ultimately results in disability at a young age [8, 9, 10].

In the literature, the diagnosis and treatment of congenital hip dislocation are discussed in great detail. However, the issues of the rehabilitation of children during conservative treatment remain unresolved. There is no consensus regarding the start time of rehabilitation in different age groups. Thus, it is necessary to develop a treatment protocol and strategies for further rehabilitation of infants.

Rehabilitation of infants with congenital hip dislocation should begin early, and it should be systematic, differentiated, and integrated. Studies have shown that it is possible to achieve best results only if functional treatment starts early involving reduction of the hip and maintenance of optimum conditions for the development of the acetabulum and the femoral head. It is necessary to use manual techniques aimed at the elimination of circulatory disorders in the joint and stimulation of ossification nuclei [8].

## Conservative treatment stages of rehabilitation of infants up to 12 months

Based on the published data, we conducted an analysis of the conservative treatment rehabilitation protocol for infants with congenital hip dislocation.

Infants were divided into the following three age groups: 7 days to 3 months, 4 to 6 months, and 7 to 12 months. Based on this, we compiled a plan for further rehabilitation. [8, 9, 10]

The authors established the following diagnostic protocols: for infants under the age of 3 months, the protocol included clinical, functional, and ultrasonographic examinations and for infants above the age of 3 months, the protocol included clinical and functional examinations as well as radiography of hip joints. Methods of conservative treatment rehabilitation of infants included physiotherapy, massage, and therapeutic swimming. As previously mentioned, the authors classified children with congenital hip dislocation into three age groups.

### 1. Infants between the ages of 7 days to 3 months

- After diagnosis, a preparatory period of 1–2 weeks was required for further reduction of dislocation. During this period, the following interventions were prescribed: stretching exercises for the adductor muscles (up to 5 min, repeated up to 4–6 times), application of a load to the buttocks (gluteus muscles), warm (37°C, 10 min) paraffin–ozokerite applications to the hips prior to massage, relaxing massage with a focus on the buttocks and thighs, warm baths (37°C, 10 min), use of a Frejka pillow (as a preparatory step for translation into the functional abduction splint), and iontophoresis with aminophylline, 10 session, on the lumbar area (for infants above the age of 2 months). When abduction of the lower limb was achieved, the patient was transferred into a functional abduction splint.

- When reduction and fixation of the limb in the splint was achieved, the next steps were as follows: paraffin–ozokerite applications before massage (37°C, every other day), stimulating massage with emphasis on the muscles of the back and buttocks (10–15 sessions, 20 min each), massage to the back and lumbar muscles with the elements of relaxation and stimulation (in a position of abduction and internal rotation, 15 sessions, 20 min each), application of load (sand bag, 500–1,000 g) to the buttocks for 15–20 min after the massage (in the splint) for a slow and metered relaxation of adductor muscles, passive physiotherapy exercises in the splint [voluntary movement by the infant in the hip and knee joints in the planes that allow movement (2–3 times per

day)], physical therapy (total UV exposure, 10–15 sessions, suberythemal doses; iontophoresis with aminophylline or pentoxifylline (+), 10 sessions, on the lumbosacral area; iontophoresis with 2% solution of calcium chloride and 2% ascorbic acid solution; iontophoresis with 2% solution of zinc sulfate; magnetic therapy or magnetic iontophoresis with calcium [in the lumbosacral area, 10 session, 5–6 min, therapy courses are repeated within intervals of 2–2.5 months]); and therapeutic swimming (in splint) up to 2 times per week during a course of rehabilitation of 2.5–3 months [11].

- During the last 1–2 months, the following interventions were applied: a course of stimulating massage of back and lower limb muscles (10–15 sessions, 15–20 min), physiotherapy (without splint), flexion, abduction, and internal rotation of hips (2–3 times per day, 10 min). The patient was being prepared for standing and for bearing an axial load on the joints [11, 12, 16].

- The total treatment period was 8–10 months.

### 2. Infants between the ages of 4 and 6 months

- During the preparatory period, the following therapy was prescribed: massage for the relaxation of the adductor and strengthening of the gluteal muscles, paraffin–ozokerite application to the hip joint and proximal femur [38°C–40°C for 20–30 min every other day (10–15 applications)], freshwater treatment bath (1–2 times per week), and the continuous use of a Frejka pillow.

- After 10–14 days of preparatory treatment, the patient began to wear a functional splint continuously. During this period, the following therapy was applied: massage (15–20 sessions) to stimulate and strengthen the muscles of the back and buttocks, mineral wax/paraffin (10–15 applications) at 38°C–40°C applied every other day to the hip joint area and the proximal femur, and therapeutic swimming in freshwater up to 2 times per week. To prevent flexion–adduction contractures (for 5–7 days prior to transfer to a different functional splint) it was necessary to perform a relaxing massage of the lower limbs, place the infant in extension and abducted positions, and participate in therapeutic exercises and swimming.

- After 2.5–3 months, the following therapy was applied (without splint): massage (10–15 sessions), application of paraffin–ozokerite (10–15 sessions), salt and pine baths, 15 sessions, every other day (30°C–37°C for 5–10 min), iontophoresis Ca (+)–P (–)–vitamin C (–), Ca (+)–S (–)–vitamin

C (-) by three-electrode method, 10 session, on joints or bischofite ( $\text{MgCl}_2 \cdot 6\text{H}_2\text{O}$ ), 10 sessions, in a 1:10 dilution on both poles, iontophoresis with pentoxifylline, 10 session, to the lumbar area. In case of delayed femoral head ossification, iontophoresis with the following cardiovascular medication was performed: niacin (-) + novocaine (+), 10 sessions, or vinpocetine (+) and heparin (-) + novocaine (+), 10 sessions [10, 11].

- At a period of 2.5–3 months after which the patient is able to stand on their feet, they are transferred to the next functional abduction splint. During this period, the following is prescribed: stimulating massage of the back muscles and lower extremities, electrical muscle stimulation (EMS) to the front and outer thigh and buttock muscles, 10 session, every other day, and therapeutic swimming.

- If satisfactory results were achieved, limited vertical load was permitted while wearing a splint. During this period, the following is prescribed: massage, EMS to the front and outer thigh and buttock muscles every other day, and therapeutic swimming. In case of a delay in the formation of ossification nuclei, laser therapy is used (for infants above the age of 6 months).

### 3. Infants aged 7 months to 1 year

Children in this age group diagnosed with primary dislocation were admitted to the hospital. Radiography and ultrasonography tests were performed to identify causes that may prevent preparatory training. If there were signs that closed reduction is not possible, including an hourglass shape of the hip joint articular capsule (capsular ligament), fat pad hypertrophy, or transverse ligament, then a contrast X-ray of the hip joint was indicated. If arthrography showed that closed reduction was not possible, preparatory training was canceled.

- Preparatory training includes massage of the back and buttocks, continuous use of a Frejka pillow, paraffin–ozokerite application (10 applications) to the joints every other day, and positioning with weight. In addition, firming and toning massage of the gluteal muscles (in the splint, in the prone position) was prescribed.

At this stage of treatment, the following procedures were prescribed (in the functional splint): iontophoresis with pentoxifylline, 10 sessions, to the lumbar area and aminophylline-Ca, 10 sessions, to the hip joints. After 3 months, radiographic and

ultrasonic tests were necessary. If the acetabular angle was up to  $30^\circ$ , the patient was transferred into the next functional splint (in a position of abduction and internal rotation). After 2–3 weeks of treatment, an ultrasound test was performed (in the splint). During this period, a massage, 15 sessions, of lower limb muscles (in the splint) is also recommended along with ozokerite application (10–15 applications) to the hip joint, iontophoresis with pentoxifylline, 10 sessions, on the lumbar area with Ca–P–vitamin C, Ca–S–vitamin C, and Zn–S–vitamin C on hip joints, and therapeutic swimming without splint. After 3–4 months of treatment, a radiographic test was performed.

- If there was good development of the acetabulum without lateral displacement of the femoral head and indications of full bone formation, then limited axial load was permitted while wearing the splint for 4–6 weeks. The following interventions were performed: stimulating massage, paraffin–ozokerite application to the hip joints, and therapeutic swimming.

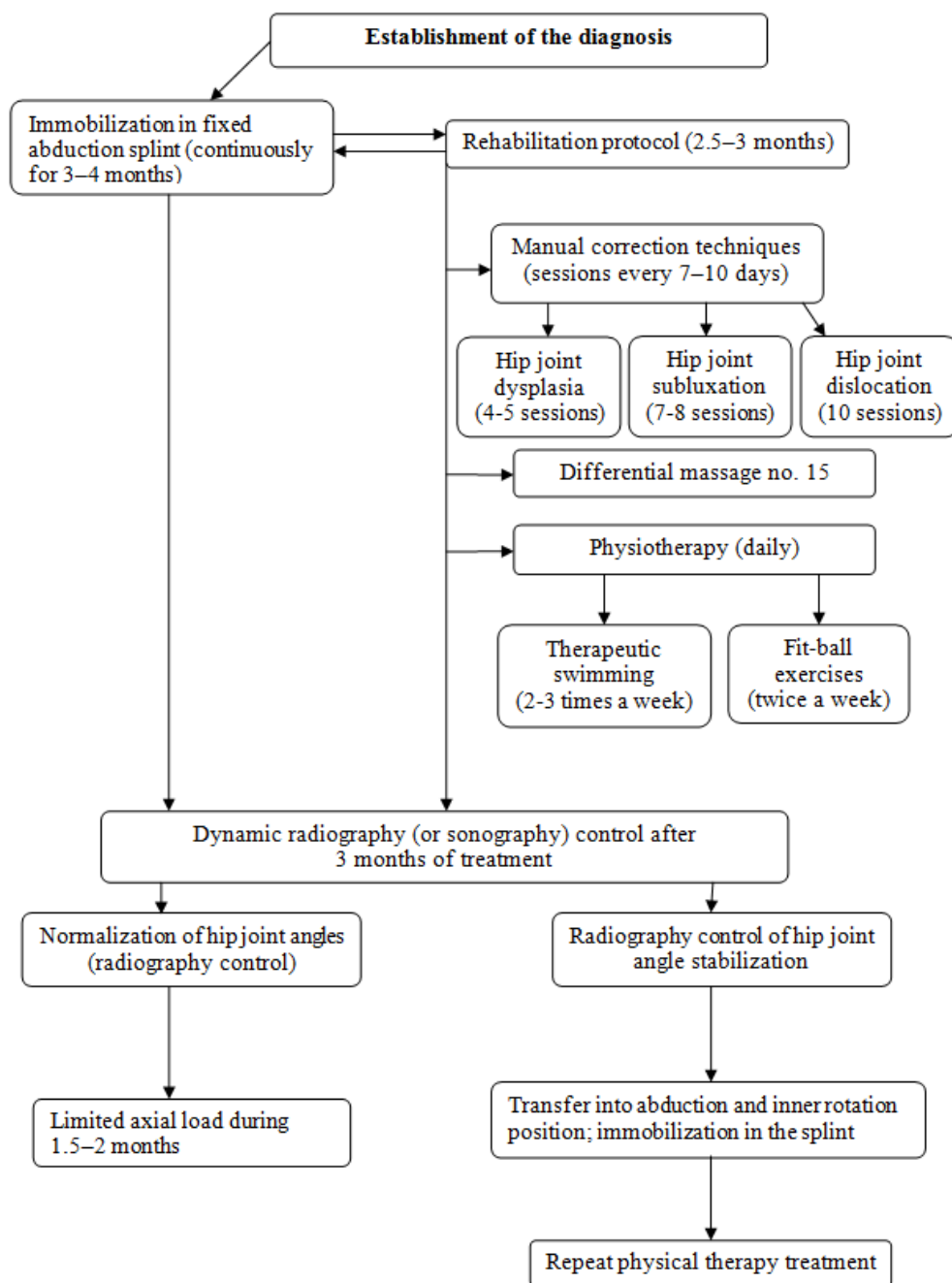
## Conclusions

Congenital hip dislocation is one of the most severe orthopedic pathologies in children, with an incidence rate of 3–4 cases per 1000 normal deliveries. Early detection and timely treatment is essential for the prevention of permanent disability.

Diagnosis of this defect should be made during the first week of life. In children under the age of 3 months, the protocol is to evaluate the clinical and functional parameters and conduct ultrasonography of the hip joints. In children above the age of 3 months, the protocol includes an assessment of clinical and functional parameters as well as radiography of the hip joints.

For the most appropriate treatment approach, it is logical to divide patients into the following three age groups: 0–3 months, 4–6 months, and 7–12 months. The rehabilitation protocol depends on age. The program must include the following: functional bracing, differentiated massage, exercise, physiotherapy, therapeutic swimming, and manual correction techniques. This prevents the progression of the defects and the development of early and late complications without delaying standing or disrupting static or dynamic functions.

Axial load is allowed in children when the clinical and radiographic parameters of the hip joint reach the age norm.



**Figure 1.** Rehabilitation protocol for congenital hip joint pathology in children in the first year of life. [8]

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### Information about the authors

- Voloshin Sergei Yurievich** — MD, PhD, chief of the department of hip pathology. The Turner Scientific and Research Institute for Children's Orthopedics.
- Belousova Ekaterina Anatolevna** — intern of the chair pediatric traumatology and orthopedics. North-Western State Medical University n. a. I. I. Mechnikov. E-mail: [qeen18@mail.ru](mailto:qeen18@mail.ru).