FEATURES OF BIRTH FRACTURE OF THE HIP IN A NEWBORN

Abstract. This article reveals the important topic of birth fracture of the hip in newborns. A birth fracture of the hip is one of the most serious complications of childbirth and requires specialised medical attention and care. Despite being a rare occurrence, a birth fracture of the hip in newborns can have a significant impact on the development and future health of the child. The risk of a hip fracture in newborns increases in the presence of the following factors: multiple births, preterm birth, low birth weight, multiple pregnancies, and the use of obstetric instruments during labour. Early detection of a neonatal hip fracture and initiation of treatment are
critical to achieve successful fusion of bone fragments and prevent further complications. Incorrect treatment or undiagnosed birth fracture of the hip in newborns can lead to post-traumatic deformities. The study of the features of birth fracture of the hip in newborns is an active area of research aimed at improving methods of diagnosis, treatment and rehabilitation. The aim of the study was to evaluate the problem of birth fracture of the hip in a newborn in order to provide adequate and timely care and prevent post-traumatic deformities and functional disorders. A newborn with a severe birth trauma, a hip fracture with displacement, was examined. The data from the inpatient record, clinical diagnostic methods, ultrasonographic, radiological, and biochemical examination results were used. The study of a birth fracture in a newborn showed the peculiarities of the dynamics of femoral fusion and remodelling during four years of observation. The varus angular displacement due to the intensive growth of the child was levelled by approximately 10 degrees annually (1 degree per month). The linear displacements self-corrected by about 0.6 cm per year. The optimal method of fixation of a hip fracture in a newborn is the classical conservative Krede-Kefer method. Birth fractures of the long tubular bones in newborns do not require perfect alignment. In the process of intensive growth, all types of displacement - angular and linear - are levelled out. In our case, the rate of levelling of angular deformities was 1 degree per month, and linear deformities - 0.6 cm per year.

Keywords: newborn, fracture, hip, repositioning, displacement of fragments.

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ОСОБЛИВОСТІ ПОЛОГОВОГО ПЕРЕЛОМУ СТЕГНА У НОВОНАРОДЖЕНОГО

Анотація. Дана стаття розкриває важливу тему пологового перелому стегна у новонароджених. Пологовий перелом стегна є одним із серйозних ускладнень при народженні дитини і вимагає спеціалізованої медичної уваги та догляду. Незважаючи на те, що пологовий перелом стегна у новонароджених є рідкісним явищем, він може мати значний вплив на розвиток та майбутнє здоров'я дитини. Ризик виникнення пологового перелому стегна у новонароджених збільшується за наявності таких факторів: множинні пологи, передчасні пологи, низька маса тіла дитини, багатоплідна вагітність, використання акушерських інструментів під час пологів. Раннє виявлення пологового перелому стегна у новонароджених та початок лікування є критично важливими для досягнення успішного зрошення кісткових фрагментів та запобігання подальшим ускладненням. Некоректне лікування або недіагностирований пологовий перелом стегна у новонародженого може призвести до посттравматичних деформацій. Вивчення особливостей пологового перелому стегна у новонароджених є активною галуззю досліджень, спрямованою на покращення методів діагностики, лікування та реабілітації. Метою дослідження було оцінити проблему пологового перелому стегна у новонароджених з метою надання адекватної та своєчасної допомоги та запобіганню посттравматичних деформацій, а функціональних розладів. Обстежено новонародженого з важкою пологовою травмою, переломом стегна із зміщенням. Використано дані виписки карти стаціонарного хворого, клінічних методів діагностики, ультрасонографічних, рентгенологічних, біохімічних результатів обстежень. Вивчення пологового перелому у новонародженого показало особливості динаміки зрошення та
ремоделювання стегнової кістки протягом чотирьох років спостереження. Варусне кутове зміщення внаслідок інтенсивного росту дитини вирівнювалося приблизно по 10 градусів щорічно (1 градус в місяць). Лінійні зміщення самоусувалися приблизно по 0,6 см в рік. Оптимальним методом фіксації перелому стегна у новонародженого є класичний консервативний метод Креде-Кефера. Пологові переломи довгих трубчатих кісток у новонароджених не вимагають ідеального співставлення. В процесі інтенсивного росту усі типи зміщення – кутові та лінійні нівелюються. Темп вирівнювання кутових деформацій у нашому випадку становив 1 градус в місяць, лінійних – 0,6 см в рік.

Ключові слова: новонароджений, перелом, стегно, репозиція, зміщення уламків.

**Statement of the problem.** Birth fracture of the hip in newborns is a rare but serious injury that can have a significant impact on the health and development of the child. This type of fracture occurs during the labour process, when the child's femur is subjected to a mechanical load that exceeds its strength. As a result of this fracture, the structure and integrity of the bone tissue is disrupted, which can cause deformation and functional impairment.

Irrespective the rarity of birth fractures of the hip in newborns, it remains one of the most challenging injuries faced by doctors and healthcare professionals working in neonatology and obstetrics and gynaecology departments. The challenge is not only to diagnose the fracture itself, but also to identify its causes, analyse the consequences and develop an optimal treatment and rehabilitation plan.

Despite the small number of scientific studies on neonatal hip fracture, this problem requires attention and detailed study. The research is aimed at revealing the features of this condition, finding out the causes of its occurrence and determining the impact on the development and quality of life of the child. Understanding the mechanisms underlying birth fracture of the hip will allow us to improve diagnostic and treatment methods, as well as develop more effective strategies for preventing this injury.

Notwithstanding significant advances in medicine and improved conditions for childbirth, hip fracture remains a pressing problem. Its detection and proper treatment are important tasks to ensure optimal conditions for the development and health of newborns. Therefore, further research into this condition and the development of effective prevention and treatment strategies are important areas of medical science and practice.

**Analysis of the latest research and publications.** Pregnancy is a time when a woman's body is working at the limit of its capabilities. This can lead to various complications that can be dangerous for the mother and her unborn child. Among the possible threats to pregnancy are ectopic pregnancy, premature birth, pre-eclampsia, gestational diabetes and other problems. Complications during childbirth
can also occur at any time. These complications can be related to the birth canal, placenta, fetus or the mother herself. Possible complications during labour include premature birth, bleeding, infection and other problems. Although a birth fracture of the hip in a newborn is rare, it can also be associated with other complications of pregnancy and childbirth. This type of fracture can occur during a complicated labour process, especially if the fetus is too large or not in the right position for a normal delivery [1,2].

Fractures are rare in neonates after caesarean section and are usually localised in the diaphysis of the femur, with a spiral fracture line [3,4]. The type of displacement of the fragments is characteristic, which is due to topographic and anatomical features. In the sagittal plane, the proximal end is displaced in flexion (hip flexor traction), in the frontal plane - in extension. In the frontal plane, due to the contraction of the abductor muscles, an angular displacement is formed for adduction - a "gaiter" type. Caesarean section does not reduce the risk of femoral fractures and increases in the case of emergency surgery [5,6].

All described cases of such injuries were treated conservatively with good results. The Bryant traction has a number of disadvantages, such as injury to the skin of the lower leg, which requires additional treatment, so it is rarely used. Pavlik's bandage - eliminates angular displacements in the frontal plane, leaving displacements in the sagittal plane. The Krede-Kefer method, on the contrary, eliminates the sagittal plane displacement, leaving the frontal plane displacement. The latter two methods are the most commonly used [7,8].

These methods are proven and well-known, but every year new methods of treating muscle and bone diseases appear in medicine. One of them is platelet-rich plasma, which is cheap to produce because it uses the patient's own blood. There are also extremely modern treatments, such as mesenchymal stem cells, which immediately migrate to the site of injury and begin the repair process [9,10].

The aim of the article was to evaluate the problem of birth fracture of the hip in a newborn in order to provide adequate and timely care and prevent post-traumatic deformities and functional disorders. A newborn with severe birth trauma and a displaced hip fracture was examined. The data of the inpatient record, clinical diagnostic methods, results of ultrasound, radiological and biochemical examination were used.

Presentation of the main material. The breech presentation of the fetus, which accounts for approximately 3-4% of births, is a risk factor for perinatal morbidity [11]. We studied 37110 deliveries by caesarean section, and in 418 (1.1%) fetal injuries were detected. The most common injuries were skin lacerations (272), kcephalogematomas (88), clavicle fractures (11), brachial plexus injuries (9), skull fractures (6), and facial nerve palsy (11). Femoral fractures are rare after vaginal delivery in the breech position, after difficult fetal repositioning, and during caesarean section [12]. We describe a case of a birth fracture of the femur in a newborn with a breech presentation and caesarean section. The typical fracture site is the diaphysis of the bone, but cases of epiphysiolyis of the distal end of the femur have been described. It is believed that emergency caesarean section in the breech
position has a higher risk of long bone fracture than vaginal section [13]. The main method of treatment of such fractures is conservative - traction according to Bryant, modified Pavlik tourniquet (bandage) [14].

**Clinical case.** Boy B., second day after the first complicated delivery, breech presentation, caesarean section. Maternal blood group B(S), Rh+. The course of pregnancy - chronic chlamydia, ureaplasmosis, cytomegalovirus, herpes, placental hyperplasia, infectious chronic mycoplasma, diffuse goiter of the 1st degree, euthyroidism.

The child's blood group is 0(1), Rh+. Birth weight 2700 g. Length 49 cm. Head circumference 32 cm, chest - 31 cm. The surrounding water is clear. The general condition of the child at birth is relatively satisfactory. Physiological weight loss of 100 g. The Apgar score is 8 points. After the first day, the general condition deteriorated sharply. Swelling of the left thigh progressively increased, the leg was crooked, blue, cold, the slightest movement of the leg caused severe crying, anxiety of the child. On examination, the child was restless, the slightest movements of the left leg were accompanied by a strong cry, anxiety. The left hip is deformed, curved, significantly increased in volume, the skin is cyanotic, tense, and there is pathological mobility of the limb.

Ultrasound of the brain - compaction of vascular plexuses on both sides, increased echogenicity of brain structures, subependymal cyst in the left ventricle - 2.5 mm. Echo-CS - open oval window 2.8 mm. Ultrasound of internal organs - liver enlarged, right lobe 47 mm, normal echogenicity. Complete blood count - within normal limits. Biochemical blood test: potassium -5 mmol/l, sodium - 134.4 mmol/l, calcium ions - 1.03 mmol/g, glucose 4.0 mmol/l, total bilirubin 266.0 μmol/l, direct - 66.5 μmol/l, indirect - 199.5 μmol/l.

An X-ray of the left hip, on the second day after the injury, revealed an oblique-transverse fracture of the diaphyseal part of the bone with a displacement in extension at an angle of 40 degrees, full width in width, and 1 cm in length and shortening.

![Fig. 1. Lateral radiograph of the left hip. Characteristic angular displacement of the birth fracture.](image-url)

A gentle, closed reposition of the hip fracture was performed, the leg was maximally bent in the hip joint, straightened in the knee joint and fixed to the body with an elastic bandage using the Krede-Kefer method. The toes of the fixed foot were free from the bandage in order to control the blood supply and sensitivity of the limb. The next day, a control retgenogram was performed. It was possible to completely eliminate the angular extension displacement, but there was an angular varus displacement of up to 20 degrees, a complete transverse displacement, and a shortening of 3.5 cm. The sharp end of the distal end of the femur was almost displaced to the metaepiphysis of the proximal end of the femur. A week after the fracture, signs of fracture healing appeared. A month later, a large hypermoscelium formed, covering the fracture site in the form of a coupling. The fragments fused in the position of varus deformity (45 degrees), full transverse displacement and shortening by 3.5 cm. The diameter of the normal femur was 0.6 cm, and the diameter of the fused femur was 1.5 cm (Fig. 2).

Fig. 2. Lateral radiograph of the hip after 1 month. Complete fusion. The axis of the bone in the sagittal plane is normal.

The bandage was removed from the leg, and exercise therapy of the limb was started. The child was under dispensary observation. At the time of discharge, the shortening of the left hip was 3.5 cm, and the angular varus deformity of the hip was 45 degrees.
Fig. 3. Seventh month of follow-up. Shortening of the left femur by 3 cm, varus deformity - 37 degrees.

The condition of the left femur was monitored annually. No deviations in the child's physical development were observed - he started sitting and walking on time. Initially, the child limped heavily on the left leg, which was easily eliminated by compensatory orthopaedic shoes. The lameness gradually decreased, and the axis of the leg was levelled. After 4 years from the date of injury, the control radiograph showed that the hip axis had fully recovered, with a 1 cm bone shortening, the perimeter of the left femoral diaphysis was 2 cm, and the healthy perimeter was 1.5 cm. Dynamic follow-up showed that the varus deformity gradually decreased by about 1 degree per month and disappeared after 48 months of treatment. The transverse displacement, after 4 years, was practically levelled and manifested itself only in a slight thickening of the diaphyseal part of the femur at the fracture site within 0.5 cm. The rate of recovery of shortening was up to 0.6 cm in one year. The remaining shortening was 1 cm (Fig. 4).

Fig. 4. Left thigh four years after the injury, shortening by 1 cm.
In the future, two options are possible to align the left leg. The first is compensation of the shortening with the help of orthopaedic footwear. The second one is surgical, temporary epiphysiodesis of the healthy hip, if the shortening of the affected leg increases, which is unlikely. We hope that in the process of growth, the shortening of the left thigh will completely disappear.

**Conclusions.**
1. Birth fractures of long tubular bones in newborns do not require perfect alignment.
2. In the process of intensive growth, all types of displacement - angular and linear - are levelled. The rate of levelling of angular deformities in our case was 1 degree per month, linear deformities - 0.6 cm annually.
3. Scientific research on neonatal hip fracture is limited and requires further expansion and detailed study of this problem.

**Prospects for further research.**
Given the importance of this problem, it is necessary to increase the study of the number of clinical cases of such fractures in order to establish a reliable, dynamic mathematical dependence of bone fragments displacement in the process of child growth.

**Conflict of interest**
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