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ULTRASOUND ASSESSMENT OF VARYING DEGREES OF HIP DYSPLASIA IN NEONATES

ANNOTATION

Congenital hip disorders such as hip dysplasia, hip subluxation, and hip dislocation are among the most common musculoskeletal disorders, accounting for up to 15% of orthopaedic pathology, leading to statico-dynamic disturbances and limitation of vital functions and early disability. The incidence of these diseases according to different authors ranges from 5.3 to 50 and even 200 cases per 1000 newborns. Treatment initiated in the first month of a child's life is most effective and leads to complete anatomical and functional restoration of the joint in 88% to 98% of cases. In cases of late treatment, 10-60% of children develop one of the severe diseases - dysplastic coxarthrosis, aseptic necrosis of the femoral head, compensatory scoliosis of the spine or other anatomical and functional changes.

Key words: ultrasound, hip joint, dislocation, dysplasia, newborns, femoral head

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УЛЬТРАЗВУКОВАЯ ОЦЕНКА РАЗЛИЧНЫХ СТЕПЕНЕЙ ДИСПЛАЗИИ ТАЗОБЕДРЕННОГО СУСТАВА У НОВОРОЖДЕННЫХ

АННОТАЦИЯ

Врожденные заболевания тазобедренного сустава, такие как дисплазия тазобедренного сустава, подвывих бедра и вывих тазобедренного сустава, являются одними из наиболее частых нарушений опорно-двигательного аппарата, составляя до 15% ортопедической патологии, приводя к статодинамическим нарушениям и ограничению жизненно важных функций и ранней инвалидизации. Распространенность патологии, по данным разных авторов, колеблется от 5,3 до 50 и даже 200 случаев на 1000 новорожденных. Лечение, начатое в первый месяц жизни ребенка, наиболее эффективно и приводит к полному анатомо-

функциональному восстановлению сустава в 88–98% случаев. При несвоевременном лечении у 10-60% детей развивается ряд тяжелых осложнений, таких как диспластический коксартроз, асептический некроз головки бедренной кости, компенсаторный сколиоз позвоночника или другие анатомо-функциональные изменения.

Relevance Hip dysplasia of varying degrees in newborns According to various authors, this pathology occurs in 3-5% of newborns, and in some countries, such as Italy, Czechoslovakia, Hungary, Georgia, 5-6 times more frequently [9,13,21]. Clinical practice shows that treatment has a positive effect when initiated in the first months after birth. Early clinical diagnosis was developed as early as the middle of the last century, but in most cases, the results of orthopaedic examination require confirmation or exclusion by one of the imaging techniques: radiological or ultrasonography. According to both domestic and foreign literature, the age-related features of the hip joint in children and adolescents are poorly studied. The features of the structure of the hip joint in newborns have been most extensively studied [10,14,32], which is due, on the one hand, to the urgency of the problem of hip dysplasia and congenital dislocation of the hip. Features of the structure of the hip joint of older age groups have been studied by some authors, where data from radiological studies are given and are reduced to indicating the timing of the appearance of the main and additional ossification nuclei of the hip joint area. These studies only examine the shape and size of the acetabulum and proximal femur and their spatial position. In our opinion, this gives an idea, so to speak, of the external shape of the components of the hip joint and does not reflect the essence of the processes occurring in the acetabulum and proximal femur. However, the diagnostic capabilities of these methods in the light of the specific structure of the hip joint in children in the visualization of these structures are currently understudied, which also determines the relevance of the present study. Early diagnosis of hip joint abnormalities already in the maternity home is of paramount importance. The lack of absolute clinical criteria requires the use of objective methods of examination, the traditional one being radiography. In children, especially before the age of 3 months, the interpretation of X-rays is difficult because of the predominance of cartilaginous components of the hip joint that do not give an image on the radiograph, which does not allow the evaluation of the ratio of the femoral head to the acetabulum, to identify a variety of disorders in the structure of cartilaginous components of the joint. According to most authors, radiological examination of the hip joints is informative at the age of 3 months at the earliest, when the effectiveness of functional treatment techniques decreases [16, 23, 26, 35]. Finally, because of the radiation exposure of the child, frequent use of radiography for dynamic monitoring of treatment outcomes is precluded. Ultrasonography is a method that extends the diagnostic possibilities in the assessment of hip formation in children in the first year of life. It has a number of advantages over radiography: it makes it possible to visualise cartilage, connective tissue structures of the joint, and adjacent muscles. It is non-invasive, highly informative, radiobased, real-time, capable of assessing metric parameters, can be used repeatedly to assess treatment progression, is inexpensive and accessible, and can be used for mass examinations at the earliest time possible. There are several techniques for sonographic assessment of hip joints in children in the first year of life N.T. Harcke [18], S. Suzuki [21], T. Terjesen [4,25], etc. The method developed by Austrian orthopedist R. Graf [19, 22, 36] is the most widely used. Its advantage is the standardization of the study, a detailed classification that considers 11 degrees of maturity of the hip joint in the age aspect. A disadvantage of the method, according to some authors [7,27], is that it only involves assessing abnormalities of the bony structures of the hip joint, without paying due attention to the cartilage elements that make up most of the hip joint of newborns and children in the first year of life. Other researchers [29, 30, 37] agree that the landmarks suggested by R. Graf are not always clearly defined and the error in the construction of angles is at least ± 10. To date, there are no methods for specifying bony landmarks for sonometry in those diagnostic cases where the lower edge of the iliac bone is represented by a wide echo due to interposition of the fatty tissue of the acetabular bed or the round ligament of the head. One of the most common reasons for prescribing a hip radiograph in children in their first year of life is suspicion of congenital joint dysplasia, subluxation or dislocation of the hip. Radiological examination of the hip joints is still the traditional method of examination. A large number of ways of assessing joint development based on radiological findings have been proposed. The above-mentioned schemes are graphical in nature, while radiography does not allow evaluation of the cartilage and connective tissue structures of the joints in question. In addition, it must be taken into account that the gonads of the child, especially in girls, cannot be fully protected in hip radiography because they are relatively high at the level of the wings of the iliac bones.

Research objective: Study of the main criteria for ultrasound assessment of various degrees of hip dysplasia in neonates

Research materials and methods. 250 children (127 boys and 123 girls) aged 1 to 3 months were examined for hip dysplasia of various degrees of severity. All patients were tested on a Toshiba xario 200 hip ultrasound machine with a 5-8 mHz linear transducer.

Research results: Ultrasound examination of the hip joints of children in the first months of life is a diagnostic standard. The main indication for this method is the clinical signs of joint dysplasia in children in the first months of life. In 70% of cases, mothers during pregnancy had various pathologies (acute respiratory infections, nephropathy, toxicosis) in the first trimester of pregnancy. The most characteristic and permanent sign of hip dysplasia is the shortening (relative) of one or both legs of the child, the presence of a crease on the back surface of the hip, and restricted mobility of the affected joint. In the course of the study, indications for ultrasound were restricted hip joint mobility, the presence of this pathology in close relatives, and the presence of a characteristic skin fold in the children we examined. At

the frontal ultrasound, the picture roughly matched the image of the anterior posterior radiography. The ultrasound examination determined the displacement of the femoral head during movement. Of all the examined hip dysplasia was detected in 60 children, which was 24%. Of these, bilateral joint lesions were found in 30 (50%); left joint in 12 (20%); right joint in 18 (30%). The number of boys was 33 (55%) and girls 27 (45%). When conducting the survey, we paid attention to the angles α and β. "Angle α" is the angle of inclination of the acetabulum, which characterises the degree of bone roof development and is normally <60. As the child grows up - the α angle increases. "angle β" - characterises the degree of development of the cartilaginous roof, and is normally - >55. Depending on the size of these angles, all patients surveyed were divided into 3 groups:

- Group 1 (immature joint) - 36 patients (60%), whose angle α was 50-59 and - β>55;

- Group 2 (joint subluxation) - 15 patients (25%) with an angle α of 43-49 and an angle β of 55-77;

- Group 3 (with complete dislocation of the joint) - 9 patients (15%), whose angle α was <43, β - >77.

As we can see, sonography makes it possible to assess the condition of a child's hip joint fairly accurately, quickly and without harming it.

Conclusions: Thus, ultrasonography will make it possible to detect congenital hip pathology at an earlier stage, to start treatment in time and achieve recovery in the shortest possible time without surgery. 60 children with DTBS have been screened. Of these, 60 children: Ultrasound of the hip joint - more effective in the first 3 months of a child's life compared to X-ray examination, as cartilage tissue is better visualised by ultrasound sonography.

The ultrasound method is precise and almost harmless for the child.

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