Developmental dysplasia of the hip in newborns – a still relevant problem

Rozwojowa dysplazja stawu biodrowego u niemowląt – problem nadal aktualny

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Abstract

Developmental dysplasia of the hip in infants covers a wide range of different clinical severity, from complete dislocation, through subluxation to dysplasia, often of mild degree, which disappears on its own. The consequences of undiagnosed dysplasia may affect the motor skills of a child and an adult. A complete cure of the defect using simple nursing methods is possible only in infancy. The introduction of sonographic imaging facilitated early diagnosis of the defect, which significantly reduced the need for surgical treatment. For this trend to continue early orthopedic and sonographic examination of children with risk factors must be conducted and in Poland this should be a standard for all newborns.

Key words: DDH, children

Streszczenie

Rozwojowa dysplazja stawu biodrowego u niemowląt obejmuje szerokim wachlarzem różnego stopnia nasilenia wady, od pełnego zwilżenia poprzez podwichnięcie do dysplazji, czasem miernego nasilenia, która samoistnie ustępuje. Następstwa nierozpoznannej dysplazji mogą wpłynąć na motorykę dziecka a także osoby dorosłej. Całkowite wyłaczenie wady prostymi sposobami pielęgnacyjnymi jest możliwe tylko w wieku niemowlęcym. Wprowadzenie ultrasonograficznej oceny stawu biodrowego umożliwiło wczesne rozpoznanie. Wpłynęło to na znaczne ograniczenie potrzeby leczenia operacyjnego. Aby utrzymać ten trend należy wcześniej badać ortopedycznie i sonograficznie dzieci z czynnikami ryzyka a w warunkach polskich całą populację nowo narodzonych dzieci.

Słowa kluczowe: rozwojowa dysplazja stawu biodrowego, dzieci
**Introduction**

Dysplasia of the hip covers a wide spectrum of abnormalities of different clinical severity: from complete dislocation, through subluxation to dysplasia sensu stricto. Dysplasia in its typical version – that is developmental dysplasia may be differentiated from congenital dysplasia in which the femoral head does not develop within the acetabulum during pregnancy (in congenital arthrogryposis, Larsen syndrome, spina bifida etc.) [1].

In developmental hip dysplasia the infant is born preconditioned to develop a defect but the femoral head is usually located within the acetabulum. In ontogenesis both the head and the acetabulum of the hip develop from one conglomerate of mesenchymal cells and after the cavitation period – the appearance of joint space – special unfavorable conditions must occur for these two tightly connected structures to dislocate in relation to one another [2].

The most commonly described predispositions to defect development include: laxity of joint capsules, increased antetorsion of the femoral neck, shallow acetabulum, fetal non-physiological positioning of lower limbs. Apart from the mechanical factors, hormonal features causing the connective tissue to loosen (relaxin, estrogen) also play a role [3].

Undiagnosed dysplasia affects the child’s gait, motor function and when undetected may develop as occult dysplasia and manifest itself later in life as coxarthrosis limiting activity in adult life.

Effective treatment of dysplasia with relatively easy non-invasive methods is possible only in early infancy. This golden rule is key for pediatric orthopedists and preluxation outpatient clinics [4].

**The evolution of understanding the essence of hip dysplasia in the last 20 years**

Twenty or thirty years ago pediatric orthopedics in Poland faced the problem of a large number of limping children due to the so-called congenital hip dysplasia. At this stage of the defect development the only treatment was surgery. Three or four children were operated on because of such a defect in pediatrics clinic weekly. The key symptom assessed during the examination of a limping child was the Trendelenburg’s sign which is dropping of the pelvis on the opposite side when standing on the leg with displaced hip joint.

Nowadays the symptom is rarely observed. Orthopedists moved their focus to the first weeks of the child’s life and it turned out that the so-called congenital dysplasia does not exist. Children are born with predisposition to dysplasia and the femoral head is in the acetabulum [10]. Today the most common test is the Barlow maneuver, that is mild inducing of temporary movement of femoral head from the acetabulum. In more advanced hip dislocations we observe the Ortolani maneuver, that is with the head dislocated we try to reintroduce it to the acetabulum, i.e. relocate it by light abducting. A positive Ortolani maneuver often determines the treatment, that is whether to use the Pavlik harness or a tractor [5].

A better understanding of the morphology of the defect in infancy showed that the dislocation is not a congenital defect but rather a developmental one, hence the change in terminology from congenital dislocation of the hip (CDH) to developmental dislocation of the hip (DDH) [6].

Screening tests for predispositions to hip dislocation conducted during infancy turned out to be unnecessary. In the international medical literature on this matter doubts were raised as to the diagnostic value of screening test at that age because the defect tends to disappear spontaneously without the need for treatment and it would expose children to unnecessary tests and overdiagnosis. Sonographic imaging of newborns showed 5-15% of hip pathologies, 80% of which disappeared spontaneously [7].

The incidence of hip dysplasia is considered to be at 1% to 5%. Such discrepancies might be due to the fact that there is no uniform definition of dysplasia.

Hip dysplasia was found in 2 per 1000 newborns, i.e. 0.2%. Adult hip dysplasia which has different features cannot be detected in infancy [8].

Risk factors for hip dysplasia include: fetal presentation – breach presentation, manner of labor, female sex, first pregnancy, family history of dysplasia.

Infant care is vital, that is a shift from swaddling the infant with legs in an extended position to swaddling in a more relaxed, naturally flexed and abducted position. In Japan, where in the 1970s and 1980s the standard infant care included extended leg swaddling, dysplasia incidence was at 3.5% but decreased to less than 0.2% once an awareness campaign was launched that changed the swaddling care to the naturally flexed and abducted position. The importance of infant swaddling is seen in the higher seasonal incidence of dysplasia during winter in countries with cold climate [9]. One of the guidelines that orthopedists offer to young parents is explaining the importance of the flexed and abducted position in infants.

The natural development of hip shows that in most cases, a positive Barlow maneuver during infancy eventually disappears on its own. Repeated and forcible test of the Barlow maneuver may cause the development and fixation of the hip instability.

The Ortolani maneuver is often associated with a sound effect, a “clunk”, which is due to the dislocation of the femoral head to the acetabulum via the inversional hypertrophic changes (neolimbus) as opposed to the movement in the greater trochanter iliotibial tract, which is not associated with dysplasia [10].

The much less desirable option is when the hip pathology develops with symptoms such as: the Galeazzi sign, telescope sign, shortening of relative length, restriction in abduction with
deep, empty groin, and other symptoms reflecting complete dislocation of the head from the acetabulum are late manifestations. In such a case the diagnosis is delayed and treatment will involve special methods such as orthosis or tractor. Preventive measures did not work. That is why the first orthopedic examination combined with US imaging should be conducted at 3-4 weeks after birth before the femoral head moves out of the acetabulum. In Poland, the incidence of this defect is still high which is evidenced by a large number of hospitalizations and tractor treatment, which is why the diagnostic criteria should be a little more strict than in the USA or the UK.

Radiographic imaging in diagnosing dysplasia became insufficient because the first x-ray was taken only at 4 months due to the presence of the ossification nuclei of femoral heads, which makes radiological examination easier. In recent years, a new radiographic classification for hip joints before the femoral head ossification has been developed (IHDI) [11]. An objective examination should visualize the hip joint as early as at 1 month. Application of US imaging to evaluate the hip morphology makes the examination repeatable and provides a much earlier access to its structure.

The introduction of the Graf method in Europe was a landmark in early diagnosis of dysplasia even though this method is still treated as ancillary with the orthopedic physical assessment as the core of the diagnosis. Once the sonographic examination was introduced in Poland, the number of surgeries for displaced hip in walking children dropped significantly. In the USA sonographic imaging was not widely recommended due to costs, high false positive results of dysplasia diagnosis which occurs in less than 1% of population in that area. Sonographic imaging in the USA is recommended for children with risk factors. It seems that it is reasonable to recommend early and repeatable sonographic examinations in the Polish context [12-14].

Between 1980 and 2014, in the Department of Pediatric Orthopedics in Lublin, 1459 children were hospitalized due to hip dysplasia, 1222 were girls (83.8%) and 237 were boys (16.2%). Once the sonographic imaging was introduced in the prevention of dysplasia, the numbers for specific age ranges has been decreasing significantly (Fig. 1,2,3).

We should not artificially exaggerate the problem of dysplasia or create an epidemic of this defect, instead we must be careful in evaluations and not neglect the preventive measures which contributed to the decrease in the number of patients needing surgical treatment. In Australia, where the surgical treatment was practically abandoned and preventive methods were neglected, the incidence of delayed diagnoses of dysplasia has risen significantly, and so has the need for surgical treatment [15].

Conclusions

1. Hip dysplasia remains a problem in orthopedics
2. The diagnosis and treatment of dysplasia has been shifted to the first weeks and months after birth.
3. The nature of dysplasia is developmental, not congenital, which is why a series of examinations within the first year of life is necessary.
4. Ultrasonography provides legit and efficient imaging of the hip in a newborn and infant.
5. Radiographic evaluation of the hip is helpful at a later age (about 11-12 month).

Fig. 1. Quantitative predominance of dysplasia in girls over boys

Fig. 2. A linear distribution of the number of DDH patients in specific years

Fig. 3. Distribution of DDH patients in specific 5-year periods showing a gradual decrease in number once the preventive US was introduced
5. A complete cure of the defect using simple methods is possible only in early infancy.
6. Undiagnosed dysplasia of the hip and its consequences may manifest later in life – during adolescence or adult life – which often necessitates surgical treatment.

References