

RESULTS OF THE EARLY TREATMENT OF DEVELOPMENTAL DYSPLASIA OF THE HIP

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Abstract: This paper aims to present our considerations on the advantages of early clinical and paraclinical diagnosis, followed by early initiation of treatment in developmental dysplasia of the hip (DDH). We studied the new cases presenting for consultation with the suspicion of developmental dysplasia of the hip in the ambulatory section of Pediatric Orthopedics of the Clinical Rehabilitation Hospital Cluj-Napoca, in the period 2011-2012. DDH treatment should be staged from simple to complex and extended, with all the caution required, for the prevention of complications: abduction pants, abduction devices, traction in bed, tenotomy, plaster immobilization, surgery (bleeding reduction, various types of osteotomy, followed by plaster immobilization).

Introduction

Due to the increased incidence of hip dysplasia in our geographic area, 0.9-1.1% newborns, this pathology is frequently found in the services of pediatric orthopedics. It is known that 2/3 of dysplastic hips at birth heal spontaneously, during the first 4-6 weeks of life, in the absence of treatment. However, medical practitioners recognize diagnostic and treatment difficulties in some cases and the impossibility to differentiate cases with spontaneous healing [1].

Given the developmental dynamics of the hip, since intrauterine life until its complete formation around the age of 15 years, Klisic proposed the term *developmental dysplasia of the hip* (DDH) [2]. The term, accepted by both the Anglo-Saxon and the French schools, correctly reflects the long period over which developmental hip deficiencies may appear. Developmental dysplasia of the hip explains the possibility of discovering dysplasia either immediately after birth or subsequently, during the course of development, and motivates the absence of dysplastic signs at birth, which can be present later [3-5].

This study aims to present our considerations on the advantages of early clinical and paraclinical diagnosis, followed by early initiation of treatment in developmental dysplasia of the hip.

Material and method

We included in the study the new cases presenting for consultation in the ambulatory section of pediatric orthopedics of the Clinical Rehabilitation Hospital Cluj-Napoca, in the period 2011-2012. The studied group consisted of 615 children: 298 children of 2035 consultations in 2011, and 317 children of 2243

consultations in 2012. These were referred with the suspicion of congenital hip dysplasia, in order of frequency, by the family doctor, by their own initiative, by the neonatologist, or by specialist pediatricians.

Cases with teratologic dislocations, hip dysplasia or dislocation as part of other disorders: neurological, malformative loco-regional, etc. were excluded from the study.

Diagnosis was based on history and clinical examination, to which paraclinical examinations (ultrasound or radiography) were added, in the case of a suspicion of hip dysplasia. Diagnosis was confirmed by the correlation of all data obtained.

The imaging examinations used were hip ultrasound, then, after the age of 4 months, conventional hip radiography. After hip plaster immobilization, we sometimes felt the need for a CT scan, even with the risk of prolonged irradiation, for the confirmation of the centering of the femoral head in the cotyloid cavity; we encountered a lot of organizing difficulties, which is why we performed it extremely rarely.

When ultrasound showed the presence of dysplasia, the infant was immobilized in an abduction device, in which we tried to progressively reach the ideal position of 50-60 degrees abduction and 90-100 degrees flexion of the thigh. We maintained the abduction device for 6-8 weeks; the therapeutic result was assessed by ultrasound or radiographically, depending on the patient's age.

If the result was not satisfactory but we found an improvement, we continued to maintain immobilization for another month. We differentiated treatment depending on

the patient's age and the condition of the hip assessed clinically and by imaging.

- If clinical and imaging reassessment showed the disappearance of dysplastic signs, we suppressed immobilization, the child remaining under follow-up;
- If some dysplastic signs persisted, but with an improvement compared to the previous examination, and age was under 6 months, we continued the maintenance in the abduction device for another month;
- If the same dysplastic signs persisted, without any improvement, and age was under 6 months, in the absence of the possibility of contrast arthrography of the hip, we performed adductor and/or iliopsoas tenotomy; in addition to an adductor muscle with a variable muscular tone increase, we sometimes found a thickened tendon of the iliopsoas muscle under tension, and we dissected it close to its attachment to the lesser trochanter. Immediately after its dissection, reduction most frequently became easy and more stable. After this type of reintervention, we usually performed pelvimalleolar plaster immobilization on the lesion side (bilateral when the lesion was in both hips) and in the case of a unilateral lesion, we immobilized the side contralateral to the lesion up to above the knee. We performed the control of reduction radiologically, immediately postoperation, through the plaster, in all cases.

The plaster device was maintained for 8 weeks.

Results

Of all consultations given in the ambulatory section of pediatric orthopedics in the period 2011-2012 (4278 presentations), 615 children presented with the suspicion of congenital hip dysplasia, i.e. 14.37%.

The mean age at the first presentation was 4.1 ± 0.5 months, with a minimum age of 10 days and a maximum age of more than 1 year.

Of these, 67 cases were confirmed in 2011, and 51 cases in 2012 (Figure 1). Sex distribution in 2011 was 53 girls and 14 boys, and in 2012, 40 girls and 11 boys (Figure 2).

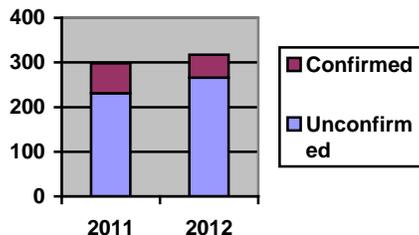


Figure 1. Number of confirmed DDH cases, of all consultations, in 2011 and 2012

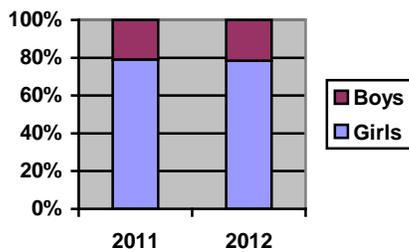


Figure 2. Sex distribution of confirmed DDH cases

Of all confirmed DDH cases (118 children), conservative treatment in abduction devices resulted in the disappearance of the signs of dysplasia in 83 cases, i.e. 70.33%. In the majority of cases, the disappearance of the signs of dysplasia occurred after approximately 6 months of immobilization in abduction devices.

Non-extensive surgical treatment (adductor tenotomy and plaster immobilization) was followed by 15 patients in 2011 and 12 patients in 2012 (Figure 3).



Figure 3. Adductor and iliopsoas tenotomy and plaster immobilization (preoperative, postoperative aspect in

plaster immobilization and postoperative aspect after the suppression of plaster immobilization)

The majority of the cases were solved by this treatment sequence; very few patients required extensive surgery: varisation osteotomy, open reduction and/or pelvic osteotomy: 5 patients in 2011 and 3 patients in 2012 (with reference to the cases taken at an age of less than 4 months).

Discussions

Permanent morphological changes in hip until its maturation should be harmonious, hierarchized and synchronous; the development of the cartilage matrix is submitted to blood vascular influences that nourish it and to the action of mechanical forces that model it. Only under these conditions it becomes a good quality coxofemoral joint. The developmental disorders in this balance will determine the appearance of coxofemoral dysplasia, practically a developmental defect and subsequently, an imperfect congruency of surfaces participating in the joint.

Thus, developmental dysplasia of the hip can occur intrauterinely, perinatally or during infancy or early childhood. The term dysplasia is defined as a “developmental disorder resulting in deformations” [6]. In the course of its development, hip is vulnerable to various aggressive factors: traumatic, infectious, vascular, metabolic.

Early diagnosis is the essence of the healing of hip dysplasia.

The mean age of presentation to the specialist for diagnosing is decreasing: this is currently 3.6 months, a relatively old age for a good functional result. In developed European countries, the mean diagnostic age is 1 month.

Early diagnosis, at neonatal age, should be made in all newborns at risk. According to Dimeglio [7], risk factors are as follows:

- family history
- breech presentation
- cesarean section
- oligoamnios
- maternal AHT
- intrauterine growth retardation
- primiparity
- high birth weight
- club foot
- torticollis
- postural change

- limitation of hip abduction
- muscular tone disorders
- female sex
- ethnic group, habits
- presence of any other malformation

Observation: in more than 60% of patients with DDH, risk factors cannot be identified. The association of two factors increases the risk four times.

The normal development of the hip in intrauterine life should meet 3 basic conditions [8]:

- genetic load 0 or correct genetic programming;
- a good congruency in the uterus, with free joint movements;
- a good neuro-muscular system around the joint.

The clinical diagnosis of dysplasia in newborns and young infants is relatively easy for an experienced doctor, who can associate and interpret the multitude of information provided by clinical examination [8]:

- dissymmetric signs present in unilateral cases or dissymmetric bilateral cases;
- Ortolani, Barlow sign and/or femoral telescoping sign;
- slight external rotation of the lower limb;
- limitation of hip abduction.

These maneuvers are easy to retain, they can be acquired by neonatologists or family doctors and can be a means of selection of newborns and young infants.

Once the suspicion has been established, the case should be taken over by the specialist in pediatric orthopedics. After the clinical examination of the patient, this proceeds to paraclinical investigations – ultrasound or radiography, depending on age. After the lesion has been diagnosed unilaterally, the subsequent appearance of dysplasia in the other hip is not excluded; this is the case of some of our patients.

We support ultrasound at a young age because:

- it is a non-invasive method
- it is a reproducible method, the result of examination being recorded
- it is an accurate method
- it is a static and dynamic examination
- it is a relatively inexpensive method, which is currently available from a technical and organizing point of view.

In order for ultrasound to bring its contribution to diagnosis, it should be performed by a person experienced in the ultrasonographic assessment of the hip in children. Hip ultrasound evidences a single section plane; its value increases when it can also be interpreted in dynamics.

Ultrasound is a paraclinical diagnostic method that is currently used in France, Germany, Great Britain, USA,

Canada, etc. Some authors use ultrasound screening for the detection of hip dysplasia in newborns [9-11].

The aim of treatment is to create joint congruency, to maintain concentric hip reduction. For an optimum monitoring of patients, children should be examined at birth, then at 2 weeks, at 2 months, at 4 months, at 6 months, at 9 months, and at 1 year. After 18 months, the incidence of dysplasia is 1/5000 children [12].

Treatment for DDH should be staged from simple to complex and extended, with all the caution required, for the prevention of complications: abduction pants, abduction devices, traction in bed, tenotomy, plaster immobilization, surgery (bleeding reduction, various types of osteotomy, followed by plaster immobilization).

Speaking only of dysplasia, treatment involves pants that create abduction and flexion in newborns, while later treatment involves abduction devices that allow an ideal position. Even with abduction devices, the patient should be monitored for the result of stability and centering of the femoral head.

The abductor device should allow a gentle manipulation of the joint, it should be easy to handle, with the progressive achievement of the ideal position of 45-60 degrees abduction and 90 degrees flexion of the thigh.

Otherwise, brutal maneuvers increase the risk of femoral head necrosis (post-reduction epiphysitis), the most frequent complication. In spite of all protection measures, the risk of femoral head necrosis is 2.5/1000 in patients who had treatment initiated before the age of 2 months and 109/1000 in the case of treatment initiation after the age of 2 months [10].

Results are clearly superior when the abduction device has allowed a certain mobility, strenghtening the hip muscles and favoring the vascularization and development of the femoral head.

Conclusions

Since developmental dysplasia of the hip has a high incidence in our geographic area, it requires an early diagnosis in order to avoid complications due to late treatment. In the period analyzed by our study, an increase in the number of consultations in the ambulatory section of pediatric orthopedics is found, as well as an increase in the number of children presenting with a suspicion of DDH. The suspicion is raised in the majority of cases by the family doctor.

Also, a decrease in the age of presentation to the first pediatric orthopedic consultation towards 4 months is found. At this age, the confirmation of diagnosis by ultrasound creates favorable conditions for treatment which is still conservative, by immobilization in abduction devices, but this is far from the optimum age of 1 month. In West European countries, the age of presentation is 1

month, age that ensures the success of conservative treatment.

Conservative treatment, by immobilization in abduction devices, provides favorable premises for a subsequent development of the hip under anatomical conditions, with the mention that the best results are obtained at a young age. In the case of late presentations, this kind of treatment is insufficient and surgery, which consists of adductor and iliopsoas tenotomy followed by pelvi-pedic plaster immobilization, is the reasonable alternative.

A better collaboration with the National Health Insurance House, with pediatric orthopedists and orthotic centers is required, in order for the House to accept the official introduction of abduction devices in Romania (e.g. the Pavlik-type device that has demonstrated its value worldwide), for child protection and care, and indirectly for the increase of birth rate. The Freyka pillow, which forces hip abduction excessively and does not allow the centering of the femoral head in the cotyloid cavity, should be withdrawn from use.

6. References

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