Ultrasound in Detection of Developmental Hip Dysplasia in Premature Born Children

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ABSTRACT

Introduction: Developmental hip dysplasia represents the most common deformation of locomotor system in children. Developmental modulation of the hip is expressed during first year of life which is important for early diagnosis and treatment. Therefore, in the practice, it is very important to set a diagnosis early with application of simple and convenient methods (ultrasound) in order to achieve fast and efficient therapeutical effect and avoid permanent disability. Aim: The aim of this paper is to point out the increase of prematurely born infants and their survival thanks to the development of Unit for Intensive Neonatal Care at the Pediatric Clinics in Sarajevo. Material and methods: Clinical investigation included 150 infants (77 girls and 73 boys) in whom the developmental hip dysplasia was diagnosed with clinical exam, ultrasound exam and x-ray of the hips. The exams were done in period of January 2012 to August 2014. Results: Two groups of patients were formed. The first one consisted of premature infants, total number of 75 (34 girls and 41 boys), with developmental hip dysplasia that was diagnosed at the first exam at the Ultrasound unit of the Pediatric clinics and at the Intensive Neonatal Care Unit of the Pediatric Clinics in Sarajevo. Second (control) group consisted of patients-on term infants who had diagnosed one of developmental hip dysplasia, total of 75 (43 girls and 32 boys) during first exam in the Ultrasound unit of the Pediatric clinics in Sarajevo. Conclusion: The frequency of premature birth is between 5 and 10% of all labors and demonstrates increasing trend. We suggest ultrasound examination of hips in each newborn, term or premature, at the age of 6 weeks after birth.

Key words: developmental hip dysplasia, ultrasound hip examination, premature infant

1. INTRODUCTION

The frequency of premature birth is between 5 and 10% of all labors and has increasing trend. Etiology of premature birth is in over 50% of cases unknown (1).

Developmental hip dysplasia is progressive disease in which secondary changes of structures of hip joint develop unless congruent articular bodies position is achieved. In Bosnia and Herzegovina the frequency of some of developmental hip dysplasia is the highest in whole Europe (Sweden 1.7; BiH 75 per 1000 of live born infants) (2,3).

2. AIM OF PAPER

The aim of this paper is to point out to the increase of prematurely born infants and their survival thanks to the development of Unit for Intensive Neonatal Care at the Pediatric Clinics in Sarajevo. The need for detection of eventually existence of some type of developmental hip dysplasia in this population and to proof that ultrasound exam is a safe, fast, simple, convenient and cheap method for detection of any type of developmental hip dysplasia in prematurely born infants.

3. MATERIAL AND METHODS

This is a prospective study. Data obtained from preterm and term infants with one of the developmental hip dysplasia forms diagnose in the period of January 2009 to August of 2011 were collected.

Patients with developmental hip dysplasia that was diagnosed based on clinical, ultrasound and x-ray exam were analyzed. Obtained data were sorted regarding gender, age, method of diagnosis, conducted treatment option and display of treatment outcome.

4. RESULTS

The research was done on the “General electronic LOGIQ C%", with probe of strength from 5 to 50 MHz (used 7.5 and 10MHz). There were no significant difference (p>0.05) in the gender and age distribution of patients (Table 1. and 2.).

| Group  | N Girls | N Boys | Total |
|--------|---------|--------|-------|
| Group I-term infants | 43      | 32     | 75    |
| Group II-preterm infants | 34      | 41     | 75    |

\[ \chi^2 = 1.7087 \quad p = 0.191 \]

Table 1. Gender distribution of infants including in study (n=150)

| Group  | Average age when developmental hip dysplasia detected |
|--------|------------------------------------------------------|
|        | girls      | boys       |
| Group I | 2.2 month  | 2.3 month  |
| Group II| 33 WG      | 34 WG      |

Table 2. Average age when developmental hip dysplasia detected

Ultrasound and X-ray diagnostics, are methods necessary to confirm the clinical findings (Table 3.).

| Group  | Clinical exam | US | Confirmed by x-ray |
|--------|---------------|----|-------------------|
|        | Positive      | Negative |                  |
| Group I| 17 (22.6%)    | 58 (77.3%) | 5 (6.6%)          |
| Group II | 21 (28.0%)   | 54 (72.0%) | 1 (1.3%)          |

\[ \chi^2 = 0.3177 \quad p = 0.573 \]

Table 3. Methods of detection of developmental hip dysplasia

The pathological findings more often affected both joints, than one (Table 4.).
Diagnosis confirmed with ultrasound were treated with conservative therapy in all cases. Patients were cured in 80% of cases (the result of one patient is unknown) in Group I, and 100% in Group II (Figure 1.).

|                  | Group I | Group II |
|------------------|---------|----------|
| Left hip affected| 0/75    | 0        |
| Right hip affected| 1/75  | 0        |
| Both hips        | 4/75    | 1/75     |
| Total affected   | 5/75    | 1/75     |

X² = 0.75, p = 0.861

Table 4. Frequency of developmental hip dysplasia affecting one or both hips

The necessity of ultrasound is shown in Figure 2., where with ultrasound were confirmed only 29.4% and 4.7% of patients, in which in a clinical examination were suspected pathological findings.

Ultrasound detected different types of changes in preterm infants, and they are shown in Figures from 3. to 8.

**5. DISCUSSION**

Clinical study included total of 150 participants, out of which there were 77 females and 73 were male. The manner
of diagnosing suspected developmental hip dysplasia was done via clinical, ultrasonic and radiological examination. In the investigated group, a positive clinical finding was established in 22.6% children while no pathological changes were found in 77.3% participants. In the control group a positive clinical finding was established in 28%, and normal finding in 72% patients. We emphasize that clinical exam is a subjective method depending on experience of attending doctors and it was shown to be insufficient method for detection of the developmental hip dysplasia (4, 5, 6). Additional check of positive clinical diagnostic signs should be performed via ultrasound or x-ray diagnostic methods (7).

Out of total 75 on term infants developmental hip dysplasia was found in 5 participants while right hip was affected in one and both hips in 4 patients. In prematurely born infants, developmental hip dysplasia was found in only one patient with both hips affected. Obtained results speak in favor that prematurely born infants do not belong to the risk group for appearance of developmental hip dysplasia, and that developmental hip dysplasia is a progressive disease in which secondary structure changes of hip tissue and its surrounding is developed unless a congruent relation of joint bodies is achieved (8, 9). Thanks to the introduction of mandatory ultrasound screening in Sarajevo Canton first ultrasound hip examination was done in first two months after birth when an ultrasound exam is sufficient to establish diagnosis. The most recent investigations recommend period 6 weeks after birth as the optimal time for the first ultrasound examination of the hip (10). Regarding examining premature infants, the advantages of the ultrasound are even more emphasized since the premature hip structures are made of cartilage (11). Introduc tion of ultrasound hip examination in diagnosis of development al hip dysplasia overcome disadvantages of clinical and radiological investigation, while radiological examination is not convenient in first three month due to the cartilage structure of joints and due to the risk of x-rays what is very important in prematurely born children (12). Ultrasonography is a diagnostic method that enables detection of developmental hip dysplasia right after birth by visualization of bone and cartilage structures. It should be implemented as a screening method of each newborn (term or preterm) at the age of 6 weeks after labor. Period for examination in preterm newborns should be calculated as corrected age (gestation age in which the infant was born and add time following labor) (13).

The study results demonstrate that developmental hip dysplasia was timely diagnosed in all participants and that all patients were successfully treated with conservative treatment methods (14,15).

Unfortunately, in both groups of patients there is a certain number of patients whose therapeutic outcome is unknown since parents did not bring child to control visit.

6. CONCLUSION

Health care in general is directed toward early detection of different deviations in children development. Developmental hip dysplasia, the most common deformation of locomotory system still has unknown etiology. Etiopathogenetic processes continuously and progres sively directly act to the degree of anatomic changes of hip and have to be interrupted with early diagnosis and appropriate treatment. The frequency of premature birth is between 5 and 10% of all labors and demonstrates increasing trend. We suggest ultrasound examination of hips in each newborn, term or premature, at the age of 6 weeks after birth, taken into account corrected age in premature born children.

CONFLICT OF INTEREST: NONE DECLARED.

REFERENCES

1. Shah PS, K Sankaran, Aziz K, Allen AC, M. Seshia, Ohlsson A, Lee SK, canadi an Neonatal Network Outcomes of Preterm Infants –29 Week Gestation Over 10-year Period in Canada. J. Perinatol. 2012; 32(2): 132-138.
2. Gavrankapetanović I. i uzradnici. Osnovi dijagnostike ortopedije. Sarajevo: Svjetlost, 2001: 26-48.
3. Bilulik V, Bilulik GM, Blazer S, Sojov P, Wiener F, Berant M. Developmental dysplasia of the hip: a new approach to incidence. Pediatrica. 1999; 103(1): 93-99.
4. Pismov V. Vrijednost kliničkih i RTG znakova pri dijagnostici urodenih displaced and luksacije kuka kod dojenčadi. U IX pedijatriskij dan BiH Referati. Udrženje pedijatara BiH, Mostar, 1969: 315-316.
5. Graf R, Tischauer Chr, Klaphj W. Progress in Prevention of Late Developmental dislocation of the Hip by Sonographic Newborn Hip “Screening”. - Results of a Comparative Follow-up Study. J. Pediatric Orthop. 1993; (PartB): 115-121.
6. Hannon G, Jacobson S. Ultrasonography screening for developmental dysplasia of the hip joint. Acta Pediatrica. 1997; 86(9): 913-915.
7. Graf R. Hip sonography. Berlin Heidelberg: Springer-Verlag, 2006: 40-43.
8. Mišanović V, Jonuzi F, Maksić-Kovačević H, Gavrankapetanović I. Prematurity as risk factor for appearance of developmental hip dysplasia. Medicinski žurnal. 2013; 19(3): 202-205.
9. Mišanović V, Jonuzi F, Maksić-Kovačević H, Gavrankapetanović I. Risk factor for development of developmental dysplasia of the hip in pre-term infants. Medicinski žurnal. 2013; 19(2): 131-134.
10. Sporišević L. Ultrazvučna dijagnostika razvojne anormalije kuka kod novorođenčadi i dojenčadi u dobi do šestog mjeseca starosti. Magistarски rad. Medicinski fakultet Univerziteta u Sarajevu, 2003.
11. Hinderaken T, Delveit AK, Irgens LM, Uden A, Reikeras. The impact of intrauterine factors of neonatal hip instability: an analysis of 1 059 479 children in Norway. Acta Orthop Scand. 1994; 65(3): 239-243.
12. Bennett GC. Screening for congenital dislocation of the hip. J Bone Joint Surg Br. 1992; 74(3): 634-644.
13. Berman L, Kleinerman L. Ultrasound screening for hip abnormalities: preliminary findings in 1001 neonates. Br Med J. 1986; 20; 293(6549): 719-722.
14. Omenzetter D. Ultrasound screening of developmental hip dysplasia: a new approach to incidence. J Pediatr Orthop. 2001: 26-48.
15. Mišanović V. Ultrasound in early detection of developmental hip dysplasia in premature born children.

Figure 8. Prematyrity hip type Ia.