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ORIGINAL PAPER

The Importance of the First Ultrasonic Exam of Newborn Hips

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Introduction: Developmental hip disorder (DHD) is a disorder in development of the acetabulum which remains abrupt (dysplasia) and probably consequential cranialisation of the femur head (luxation). **Aim of the paper:** The aim of this paper is to establish the total number of DHD and its subtypes at the first clinical and ultrasound exam of newborns in a retrospective-prospective study made in the period from 1st Jan 2006 through to 31 Dec 2010 at the Clinic for orthopaedics and traumatology in Banja Luka. **Materials and methods:** In total 6132 patients were examined and 99 cases diagnosed with DHD (dysplasia and luxation). Ultrasonic exam was done by means of electronic probe of 5-12 MHz according to standard method after Graph. Girls were significantly more present (96%). Positive family anamnesis on DHD was present with 7.8% examinee, mainly with primiparas, and/or with 77.8% children with DHD. Dominant intrauterine risk factors for DHD were: mal position of foetus in uterus (78.6%), oligoamnion (17.9%), malformation of the spinal column of the pregnant woman (3.6%), whereas with 38.4% of children with a certain form of DHD the following were found: breech presentation, caesarean section or twin pregnancy. The clinical exam indicated DHD with 8.87% examinee, out of which hip looseness was found with 5% examinees. Ultrasonic finding was positive with 99 examinee, that is with 1.61% of them (deficient and badly formed acetabulum, sleeked protrusion; 8 luxations and 91 dysplasia). Prophylactic measures were requested by 58.6% children (abductive bending and exercises), whereas 41.4% needed non-intervention therapeutic measures (traction, Pavlik's straps, Graph's knickers, plastering), after which there were no children needing surgical correction of DHD. **Conclusion:** These data indicate that clinical exam is unreliable for DHD diagnostics, and that Ultrasonic diagnostics and treatment of DHD should start as early as possible applying atraumatic helping devices and procedures in the period when all structures are elastic, flexible and adaptable. **Key words:** ultrasound, newborn, screening, dysplasia, luxation.

ization and cranialization) (1). The term "developmental hip disorder" (DHD) is most appropriate because it includes all stages in the development of this malformation and every stage of child development (2, 3). During the time of intrauterine life, conditions for DHD are created when the hip is dominantly cartilaginous, and the head is encircled with shallow acetabulum. Joint capsule is loose and intrauterine pressure is transmitted to big trochanter in one of luxable positions (4, 5). Joint capsule is stretched together with lig. capitis femoris which becomes fattened, and pelvi-trochanter musculature pulls the head of femur cranially and laterally (6). The joint capsule twists around longitudinal axis creating a narrow part (isthmus capsulae) in the form of an hourglass, due to which surgical intervention must be done (7). Upon delivery luxated hip is released from unfavourable mechanical factors and about one half of cases stabilize spontaneously and evolve into complete or partial healing (mild residual dysplasia) (8, 9, 10, 11). Nevertheless, in other cases hips remain more severely dysplastic or even unstable, and/or luxated. They need to be recognized by timely clinical, ultrasonic, and, when needed, radiograph diagnostics, then classified and properly treated. Ultrasonic screening

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1. INTRODUCTION

Developmental hip disorder (DHD) denotes prenatal and early post natal

deficient development of lateral part of acetabulum with possible consequential dislocation of the femur head (lateral-

of all newborn infants is a legal obligation which practically excludes the need for intervention because of DHD, and in particular the sequels of this once so widespread disease.

The aim of this paper is to prospectively-retrospectively establish the occurrences of DHD at the first clinical and ultrasonic examination in consecutive group of examinee followed up in the course of five years as well as to analyze the results of screening and non-intervention treatment.

2. MATERIALS AND METHODS

This five-year retrospective-prospective study lasted from 01/01/2006 to 31/12/2010. Examinations included all newborn infants that had their first clinical and sonographic check at the Clinic for orthopaedics and traumatology of Clinical centre Banja Luka. Anamnestic DHD risk factors (DHD in family, course of pregnancy and delivery), clinical factors (in particular loose hip), as well as Ultrasonic finding of both hips as final diagnostic means were analyzed (Figure 1).

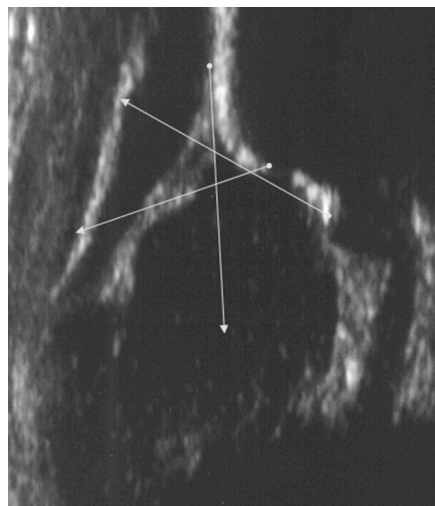


Figure 1. Ultrasonic finding of healthy hip

Then the course of treatment was followed up clinically and ultrasonically till the end for patients with discovered DHD. Ultrasonic apparatus "LOGIQ 5"CE 0459 GE Medical Systems 2002" was used and classification of DHD by Graph (Figure 2), whereas in the process of treatment Graph's knickers, traction methods and plaster knickers were used.

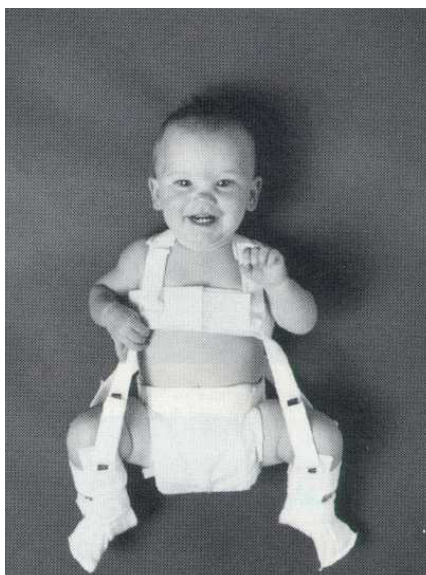


Figure 2. Graph's knickers

3. RESULTS

In the five-year period 6132 newborn infants were examined, out of which 2965 girls and 3167 boys (Table 1).

Out of 6132 newborn infants, 99 of them had some form of DHD. In that subgroup, girls were significantly more involved (96%). Positive family anamnesis on DHD was present with 7.8% examinee, mainly with primiparas, and or 77.8% children with DHD. First-born children of the examined group had the presence of DHD of 43.4% at the first clinical and sonographic examination, second-born had 39.4%, third-born 14.1% and in the fourth pregnancy 3.0%. Dominant intrauterine risk factors for DHD were:

mal position of foetus in uterus (78.6%), oligoamnion (17.9%), malformation of the spinal column of the pregnant woman (3.6%), whereas with 38.4% of children with a certain form of DHD the following were found: breech presentation, caesarean section or twin pregnancy. Most common delivery was spontaneous, vertex delivery 61.6%, natural-breech presentation 17.2%, caesarean section 19.2%. Clinical examination indicated DHD with 8.87% of the total number of examined children. At the first clinical examination of newborn infants, the most common positive clinical signs were limited hip abduction (96% of all ultrasonically diagnosed DHD), asymmetry of skin creases (87.9%), positive Palmen and Ortolani test (42.4%) and (33.3%) respectively.

Year	Number of patients examined				Total
	male		female		
2006	78	45.35%	94	54.65%	172
2007	530	49.44%	542	50.56%	1072
2008	796	51.29%	756	48.71%	1552
2009	1162	54.68%	963	45.32%	2125
2010	601	49.63%	610	50.37%	1211
Total	3167	51.65%	2965	48.35%	6132

Table 1. Patients examined by years.

Ultrasonic finding was positive with 99 examinee, and/or 1.61% (deficient and badly formed acetabulum, sleeled protrusion; 8 examinee had luxations and 91 dysplasia). Prophylactic measures were requested by 58.6% children (abductive bending and exercises; Table 2).

Non-intervention therapeutic measures were needed by 41.4% of children

Prophylaxis		Year of exam					Total
		2006	2007	2008	2009	2010	
Without prophylaxis	N	3	11	12	15	0	41
	%	7.3%	26.8%	29.3%	36.6%	.0%	41.4%
		3.0%	11.1%	12.1%	15.2%	.0%	
Abductive bending, abductive exercises	N	1	5	13	21	18	58
	%	1.7%	8.6%	22.4%	36.2%	31.0%	58.6%
		25.0%	31.3%	52.0%	58.3%	100.0%	
Total	N	4	16	25	36	18	99
	%	4.0%	16.2%	25.3%	36.4%	18.2%	100.0%

Table 2. Prophylaxis by the years of examination

Treatment		Year of examination					Total
		2006	2007	2008	2009	2010	
Abduction knickers	N	1	5	13	21	12	52
	%	1.9%	9.6%	25.0%	40.4%	23.1%	52.5%
		25.0%	31.3%	52.0%	58.3%	66.7%	
1.0%	5.1%	13.1%	21.2%	12.1%			
Pavlik's straps	N	3	9	11	12	6	41
	%	7.3%	22.0%	26.8%	29.3%	14.6%	41.4%
		75.0%	56.3%	44.0%	33.3%	33.3%	
3.0%	9.1%	11.1%	12.1%	6.1%			
Plaster in humane position	N	0	2	1	3	0	6
	%	.0%	33.3%	16.7%	50.0%	.0%	6.1%
		.0%	12.5%	4.0%	8.3%	.0%	
.0%	2.0%	1.0%	3.0%	.0%			
Total	N	4	16	25	36	18	99
	%	4.0%	16.2%	25.3%	36.4%	18.2%	100.0%

Table 3. Treatment after examination by the year of examination

with DHD abductive knickers in 52.5% cases (Pavlik's straps 41.4%, plastering in humane position 6.1%; Table 3). After these measures of treatment there were no children that needed intervention correction of DHD.

4. DISCUSSION

DHD is differently distributed in races in the scope of 2-50 and more on 1000 deliveries, and it shows differences within regions of one and the same country as well. It is also tied to ethnic membership, so that, for example, it is unknown with Bantu Blacks, whereas with Canadians it is present with even 12.3% of newborn infants due to traditional bending with abducted and extended hips (11, 13). The lowest incidence of DHD is in Hong Kong (0.01%), then in North Ireland (0.14%), Sweden (0.17%), America (0.2-0.4%), Great Britain about 1.5% (7,9,10). At the territory of former Yugoslavia, among Slavonic peoples the incidence of DHD is about 2.0% (14, 15), with marked regional variations of 0.2% to 4% (4). Our work showed similar presence of risk factors of DHD as in other studies.

Analysis of the results of this study showed that clinical result yields about 80% of falsely positive findings in comparison with Ultrasonic finding as golden standard. This is understandable as clinical check up depends to a great extent on doctor's experience but also on the stage of DHD, since not all

forms of DHD yield a clinical picture in the first few months of life. Thus, for example, Maxwell states the incidence on the basis of clinical check up of 1,66% (16), whereas Šoć states the incidence of up to 40% through a research in Donja Zeta. Barlow mentions a very low rate of DHD incidence on the basis of clinical check up. He did a check up of children on delivery, then when they were four months old and came to conclusion that 60% of hips which are unstable on delivery stabilize in the first week, 88% in the next two months, whereas about 12% have residual instability (12). Kosar P. and associates did a study on 3400 newborn infants in Ankara during 2009, comparing standard (morphometric) and dynamic methods (Graph's and Harcke's method), and ascertained 81.47% of type I – normal hip by Graph, and 91.48% stable hip by Harcke. Dynamic test (Harcke) was not done with hips *I1b* and worse and hence aberration in the percentage of normal and stable hips is possible (18). At the University Hospital in Stockholm a comparison of Ultrasonic findings by Harcke and by Graph on 536 patients with clinical signs of unstable hips was made. By Graph 77% of hips were normal, 20% borderline and 3% pathological. Dynamic, Harcke's Ultrasonic method revealed 88% of stable, 10% of unstable and 2% of dislocated hips. Among all of them clinical check up revealed 82% of stable, 14% of un-

stable and 4% of dislocated hips. About 21% of normal hips by Graph were unstable on dynamic test. The lowest number of normal and pathological hips was presented by Graph's method, and the highest number of hips was selected for following (19). All stated data indicate that regardless of present or absent risk factors and clinical findings, Ultrasonic diagnostics is crucial for classifying forms of DHD and further prophylactic and therapeutic measures (15). Certainly, what is necessary with all that is intensive following of patients until complete healing.

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