The Importance of the First Ultrasonic Exam of Newborn Hips

Predrag Grubor¹, Mithat Asotic², Mirza Biscevic³, Milan Grubor¹
Department of orthopaedics and traumatology, Clinical Centre Banja Luka, Bosnia and Herzegovina¹
Pl Hospital Travnik, Travnik, Bosnia and Herzegovina²
Department of orthopaedics and traumatology, Clinical centre of University of Sarajevo, Bosnia and Herzegovina³

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 ultrasonic 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 intraterine 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.

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 (lateralization 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 incircled 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 pelvitochanter musculature pulls the head of femur cranially and laterally (6). The joint capsule twists around longitudinal axis creating a narrow part (isthmos 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
of all newborn infants is a legal obliga-
tion 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 prospec-
tively-retrospectively establish the oc-
currences of DHD at the first clinical
and ultrasonic examination in consec-
utive group of examinee followed up in
the course of five years as well as to an-
alyze the results of screening and non-
intervention treatment.

2. MATERIALS AND
METHODS

This five-year retrospective-pro-
spective 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 trauma-
tology of Clinical centre Banja Luka.
Anamnestic DHD risk factors (DHD
in family, course of pregnancy and de-

delivery), clinical factors (in particular
loose hip), as well as Ultrasonic finding
of both hips as final diagnostic means
were analyzed (Figure 1).

3. RESULTS

In the five-year pe-
riod 6132 newborn in-
fants were examined,
out of which 2965
girls and 3167 boys
(Table 1).

Out of 6132 new-
born infants, 99 of
them had some form
of DHD. In that sub-
group, girls were sig-
nificantly more in-
volved (96%). Positive
family anamnesis on DHD was present
with 7.8% examinee, mainly with pri-
miparas, and or 77.8% children with
DHD. First-born children of the exam-
ined group had the presence of DHD of
43.4% at the first clinical and so-

nographic examination, second-born
had 39.4%, third-born 14.1% and in the
fourth pregnancy 3.0%. Dominant in-
trauterine 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 pres-
entation, caesarean section or twin preg-
nancy. Most common delivery was
spontaneous, vertex delivery 61.6%, nat-
ural-breech presentation 17.2%, caesar-
ean section 19.2%. Clinical examina-
tion indicated DHD with 8.87% of the
total number of examined children. At
the first clinical examination of new-
born infants, the most common posi-
tive clinical signs were limited hip ab-
duction (96% of all ultrasonically diag-
nosed DHD), asymmetry of skin creases
(87.9%), positive Palmen and Ortolani
test (42.4%) and (33.3%) respectively.

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

Non-intervention therapeutic meas-
ures were needed by 41.4% of children

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of patients examined</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>male</td>
</tr>
<tr>
<td>2006</td>
<td>78</td>
</tr>
<tr>
<td>2007</td>
<td>530</td>
</tr>
<tr>
<td>2008</td>
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<td>2009</td>
<td>1162</td>
</tr>
<tr>
<td>2010</td>
<td>601</td>
</tr>
<tr>
<td>Total</td>
<td>3167</td>
</tr>
</tbody>
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Table 2. Prophylaxis by the years of examination
with DHD abductory 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 60% of normal 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 \( h_{ib} \) 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 unstable 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.

REFERENCES