JMA

Jurnal Medical Aradean (Arad Medical Journal)
Vol. XVI, issue 1-4, 2013, pp. 5-10

THE IMPORTANCE OF ULTRASONOGRAPHY IN EARLY DIAGNOSIS AND TREATMENT OF DDH

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Abstract. Ultrasound screening of hips in newborns and infants is important for early diagnosis of developmental dysplasia of the hips (DDH).The aim of this study is to analyze the results of ultrasound screening of the hips in newborns and infants and to establish the importance of ultrasonography in early diagnosis and treatment of DDH. Analysis of the results of ultrasound screening of the hips in our study showed that there is a significant number of dysplastic hips. Treatment of dysplastic hips depends on age of the patients.

Keywords: Developmental dysplasia of the hip (DDH), ultrasound hip, early diagnosis and treatment of DDH.

Introduction

The spectrum of DDH (American Academy of Pediatrics, 2000) includes hips that are:

Dysplastic: The hips have inadequate acetabulum formation. This disorder may not be clinically apparent but causes various ultrasonographic or radiographic abnormalities.

Subluxated: The femoral head can be partially displaced outside of the acetabulum.

Dislocatable: The femoral head is located within the acetabulum but can be displaced by stress maneuvers.

Dislocated: The femoral head is completely outside the acetabulum. Dislocations are divided into two types: teratologic dislocations and typical dislocations.

Teratologic dislocations occur early in utero and often are associated with other problems, such as arthrogryposis, congenital clubfoot or spina bifida. These dislocations are extremely rare and usually require surgical treatment.

Typical dislocations usually occur in healthy infants and may develop prenatally or postnatally.

The most commonly used method of ultrasonography in the diagnosis of DDH is the Graf technique (Graf, 2006).

Most developed countries report an incidence of 1.5 to 20 cases of DDH per 1000 births,
depending in part on the methods of screening used (Shipman et al., 2006).

Ultrasonography is a method of choice for early diagnosis of developmental dysplasia of the hip (DDH) in newborns and infants. It is simple and noninvasive method for visualisation of the hip. While treating the DDH, it gives possibility for multiple performances and for monitoring (Zgoda et al., 2009, Rosendahl et al., 1997)

The goals of a screening program are early diagnosis in all patients who have DDH, when therapy is most effective and noninvasive.

Early recognition with prompt treatment has been shown to be effective, so it is crucial to achieve an early diagnosis and treatment (Kalamchi et al., 1982).

Radiographs are available and relatively low in cost. The main limitations are radiation exposure and radiography's inability to demonstrate the cartilaginous femoral head. Radiographs are of limited value during an first 3-4 months of infants life, when the femoral heads are composed entirely of cartilage, but they become more reliable for use in infants 4–6 months of age, with the

appearance of femoral head ossification (American Academy of Pediatrics, 2000; Dezateux et al., 2007).

The treatment for hip dysplasia depends on the age of the patient and on the type of the hip disorder according to the Graf method.

Abduction brace, Pavlik harness, Tübingen hip abduction orthosis, close reduction and open reduction if necessary are used in treatment of DDH.

Materials and methods

The purpose of the current study is to determinate the incidence of DDH and to evaluate the results of early orthopedic treatment in the first month of life in newborns and infants under 6 months from Arad County, for a period of four years.

This study I performed from 2009 to 2012, by clinical examination and ultrasound of the hips (static method Graf) of the newborns and infants, in two private medical centers in Arad, C.M. Lasser System and MedLife Genesys Hospital.

From the study group of 1507 newborns and infants under 6 month, we found 27 cases of DDH, the incidence was 1.97%.

Results

Routine clinical examination was followed by the detection of the abduction limit of affected hip and the hip instability detection by Ortolani maneuvers, Barlow, Palmen and the joint hyperlaxity.

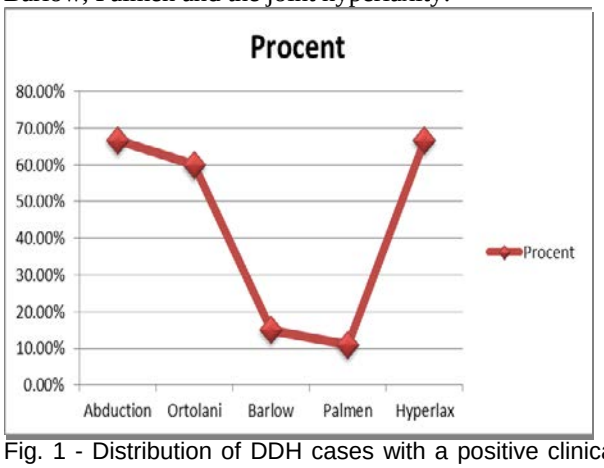


Fig. 1 - Distribution of DDH cases with a positive clinical signs

We used ultrasound Graf classification system in our study – tabel1.

Type 1 – hip mature;
Type 2a – hip immature;
Type 2c – hip dysplastic but still centered;
Type 2d – hip dyplastic and decentered (first stage of luxation);
Type 3 – hip subluxated
Type 4 - hip luxated

Table 1 – Classification of DDH according to Graf method

On the study group of 1507 newborns and infants under the age of six months, we viewed pathological changes in 27 cases (1.79%), that we have classified by Graf classification:

Type II A - 23 hips (85 % from DDH)
Type II C - 2 hips (7,4 % from DDH)
Type II D -1 hip (3,7 % from DDH)
Type IV - 1 hip (3,7 % from DDH)

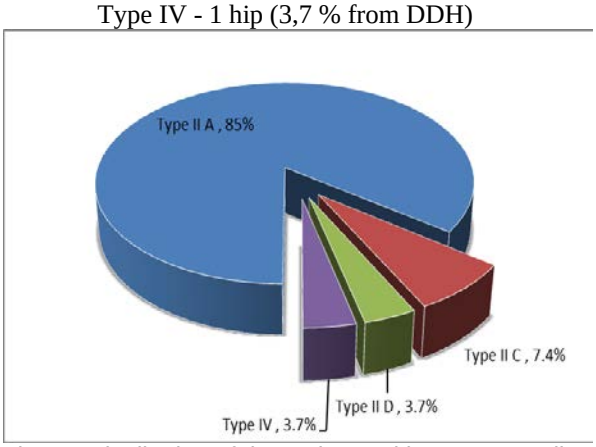


Fig. 2 - Distribution of the patients with DDH according to Graf method

For all patients diagnosed with DDH, we have established orthopedic treatment individualized to the ultrasound type:

- To patients with type II A, I have recommended orthopedic abduction brace – picture 1A - for two months followed by clinical and ultrasound control;

Picture 1A - Orthopedic abduction brace

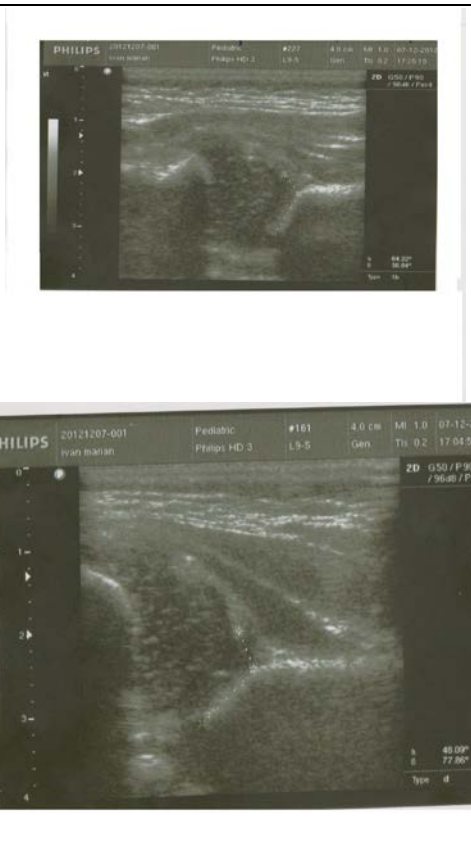
- To patients with type II C, diagnosticated in first month of life, I have recommended Tübingen hip abduction orthosis for two months followed by clinical and ultrasound control.
- To patients with type II D and type IV, diagnosticated in first month of life, I performed close reduction and fixed it with Dr. Bernau - Tübingen hip abduction orthosis – see picture 1B

Picture1B - Dr. Bernau - Tübingen hip abduction orthosis

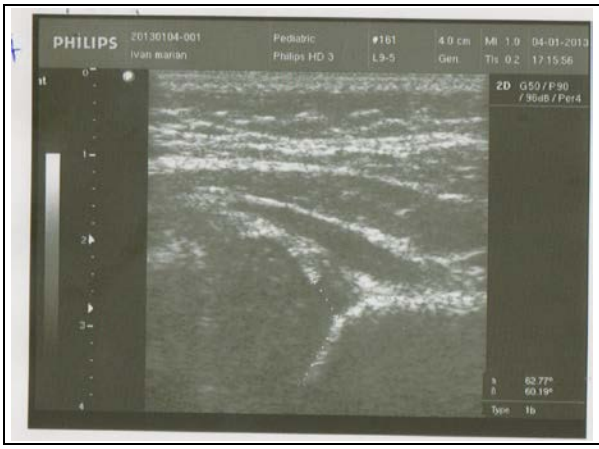
It is very important to collaborate with parents because they have to understand the severity of the disease and the importance of correct treatment.

The decision to stop the treatment was made when the hips has become type I A.

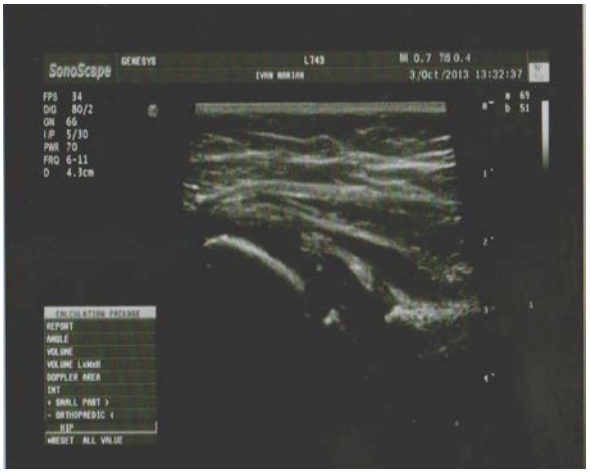
We found mature hips at all control hips ultrasound performed at 2 months after starting treatment, including the type IV.



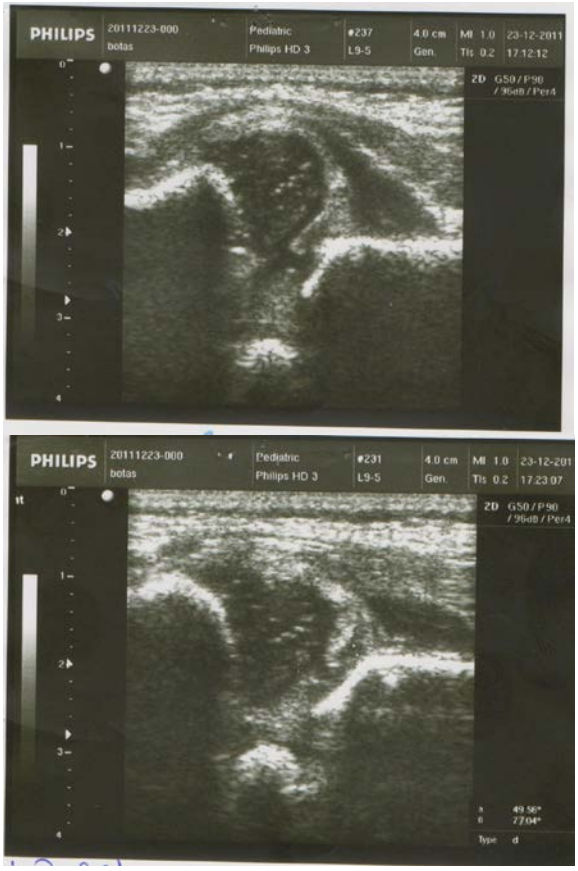
Picture 2- Illustration of early ultrasound diagnosis of left hip dysplastic, type II D, (newborn, boy - 3 weeks) and ultrasound of left hip after close reduction and imobilisation with Dr. Bernau -Tübingen hip abduction orthosis.



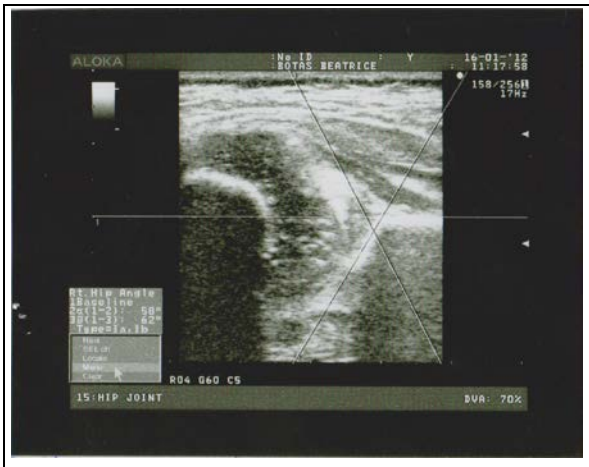
Picture 3 – the same hip as in picture 2, after 1 and 2 months of treatment and ultrasounds control – final result - hip type IA – when I stop the treatment



Picture 4 – the same hip at 11 months.

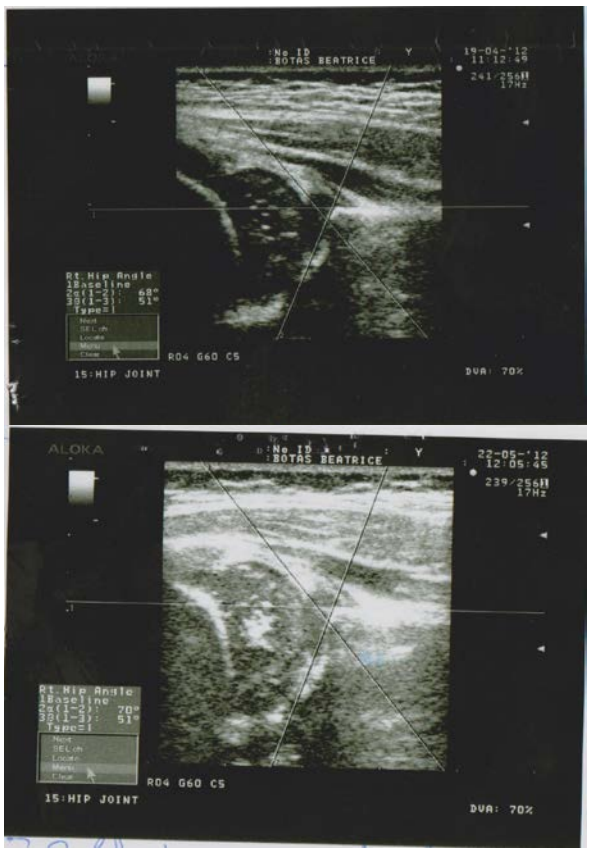


Picture 5 - Illustration of early ultrasound diagnosis of right hip luxated, type IV, (newborn, girl - 4 weeks) and ultrasound of the same hip after close reduction and imobilisation with Dr. Bernau-Tübingen hip abduction ortosis.



Picture 6 - the same hip as in picture 5, after 1 month of treatment and ultrasounds control – type II A.

Picture 7 - the same hip as in picture 5, after 2 month of treatment - final result - hip right type IA, when I stop the treatment.



Picture 8 – ultrasound control of the same hip as in picture 5, at the age of 4 and 6 months, of the same infant.

Picture 9 – ultrasound control of the same hip as in picture 5, at the age of 11 months, of the same infant, when she started to walk.

Discussions

Two most commonly used approaches for early diagnosis of DDH in literature are physical examination and hip ultrasonography. (Graf, 2006; Canale et al.2008; Solomon et al., 2010).

Ultrasound can detect DDH in newbornes with normal physical examination.

The goals of a screening program are early diagnosis in all patients who have DDH, when therapy is most effective and noninvasive.

Early recognition with prompt treatment has been shown to be effective, so it is crucial to achieve an early diagnosis and treatment (Kalamchi et al., 1982).

Use of ultrasound has reduced the number of late presenting cases, shortened treatment time, and decreased the number of surgical procedures of the hip joint (Synder et al., 2006).

An early and proper orthopedic treatment for DDH, established in the first month of life, leading to cure of the disease in a very short time. In our study newbornes with type II C, II D and IV hips were treated with a Dr. Bernau - Tübingen hip abduction orthosis and we found mature hips at all control hips ultrasound performed at 2 months after starting treatment, including the type IV.

Conclusions

Analysis of the results of ultrasound screening of the hips in our study showed that there was a significant number of dysplastic hips in newborns.

The treatment for hip dysplasia depends on the age of the patient and on the type of the hip disorder according to the Graf method. We can conclude that an early and proper orthopedic treatment for DDH, established in the first month of life, leading to cure of the disease in a very short time.

It is very important to collaborate with parents because they have to understand the severity of the disease and the importance of correct treatment.

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