

Developmental Dysplasia of the Hip in a Developing Country. Rebuilding the Strategy for Early Diagnosis and Management

Artid Duni

National Trauma Centre, Laprake, Tirana, Albania

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Correspondence:

Artid Duni, MD
National Trauma Centre, Laprake,
Rr, Margarita Tutulani, P TID Ap10/3
Shk1, Tirana, Albania
E-mail: aduni17@yahoo.com;
aduni@abissnet.al

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Abstract

Background. Early diagnosis of developmental dysplasia of the hip (DDH) in our country, remains a major problem with about 40% of cases presenting after the walking age.

Material and Methods. In a district near the capital with 111000 habitants, and 900 new births per year, we applied an experimental chain of screening. Then we analyzed the general epidemiological indexes and the rate of early diagnosis. Our study was extended from 1999 to 2007 dividing in two periods (before and after January 2004) comparing the results in order to see the effectiveness of the new strategy applied after 2004.

Results. We treated 111 DDH cases from a total number of 8490 live births with an overall incidence of 13%. From 55 children treated during 1999-2004, 20 of them or 36.3% were above one year of age at the beginning of treatment and only 35 of them (63.7%) have been treated under the age of one year. After 2004 we treated 56 children but 49 of them or 87.5% have been treated before one year of age and 7(12.5%) after this age. ($p < 0.004$)

Conclusion. New strategies could change the reality of the early diagnosis and treatment of DDH in our country.

Introduction

In the past years early diagnosis of developmental dysplasia of the hip (DDH) was included in the health policies in our country. Clinical examination for DDH was one of the important parts of the obligatory scheduled well baby visits starting soon after birth. The centralized health system was projected to provide health care even in the most distant villages yielding very good results regarding the early diagnosis of DDH. Besides that, the monumental work of a team of great Orthopedic Surgeons brought the early diagnosis of DDH close to very good results.

The huge social changes that happened in our country led to dramatic changes also in the health system. The population moved towards big urban

centers and the small health care spots in the villages disappeared breaking the chain of early diagnosis of DDH. Early diagnosis and appropriate early treatment, when needed, are the keys to have good long term results in DDH (1-4). National screening programs proved to be the best way for achieving the goal of detection of the cases requiring treatment. However designing and achieving nationwide screening is very expensive (5) and talking about a developing country such a program could only be possible with the collaboration of governmental departments.

In order to acquire this necessary support for a bigger program in the future, we designed a two part study. The primary purpose of our work was to collect the related data about DDH and then evaluate

the effect of a new screening and treatment protocol on the outcome of children having documented hip dysplasia.

Patients and Methods

The study is performed in a district located in the central part of the country which includes a surface area of 200 square km with a population of 111000 habitants. There are two big Maternity Hospitals that cover around 900 births per year, both equipped with ultrasound machines and trained specialists in the field of hip pathologies. There are also four small health care centers located in different villages responsible for a very small number of births where general practitioners and experienced midwives take care of deliveries.

The study was divided in two main parts. The protocols applied were approved by the Ethics Committee of the National University Service of Orthopedics and Trauma. The Hospitals involved in the study are the Maternity Hospitals of the district as well as the general Hospital and also the National University Hospital Center of the country.

The first part of our study is an observational study. During the period January 1999-December 2003 all the babies diagnosed as having DDH by USG and/or plain radiographs of pelvis were reevaluated by the authors. Age in months, presence of risk factors, treatment modalities and follow up results during the observational period were recorded. Any complication, treatment change and other factors that may have an effect on the outcome were also recorded.

After January 2004 we started our new program which mainly focused on increasing the awareness of DDH to the general population and among the medical staff. Main element of this program was the reeducation of the medical staff including nurses, midwives, pediatricians, radiologists, obstetricians and general practitioners. Awareness of DDH in the general population was increased by local TV and radio programs, brochures and educational meetings to parents. After two years 160 nurses, 24 midwives, 9 pediatricians, 2 radiologists, 12 obstetricians and 28 general practitioners were contacted and directly instructed.

During January 2004-december 2007 the same data were collected again. To delineate the effect of the program statistical analysis was performed by comparing the data before and after January 2004.

Analyses were performed by using the chi square test and, p value is set to 0.05

The clinical material that we analyzed was collected from the registries of the outpatient section of the health department of the district, the city hall registry, the clinical charts of the Maternity Hospitals, the clinical charts of the health centers of the villages. The guidelines applied were those recommended from the AAP (1). Clinical examination was performed to all the newborn babies (6). Ultrasound was performed after two weeks in those who had positive clinical tests or to those who resulted negative but with at least one risk factor for DDH (7,8). Positive cases from both clinical or ultrasound examinations were referred to the orthopedic surgeon for reevaluation and possible treatment. Treatment at early ages was started with prophylactic diapering until confirmation with ultrasound or radiography of the pelvis and then treatment was continued with the Becker-Mittelmeyer device. All the babies reported as negative on clinical or imaging examination were advised to be reexamined during the periodic well baby visits in the health care centers. In case of any doubtful or unsecure clinical examination the cases were examined by the orthopedic surgeon.

January 2004 was set as the limit point after which the strategy was thought to begin giving the first results. After the analysis of the general epidemiologic indexes for the total number of cases, the data collected were separately analyzed comparing the two groups (before and after 2004), for the rates of early diagnosis, and surgical vs. conservative treatment. We also analyzed the modalities of treatment in two different age groups.

Results

During the first study period between January 1999 and December 2003 and the second period between January 2004 and December 2007, 8490 live births were detected in the region. Detailed data is presented in Table 1.

Table 1: Epidemiological data for DDH.

1999-2007	Live births	DDH	Males	Females	Left	Bilateral	Right
Number	8490	111	22	89	59	32	20
Percentage		1.3	20	80	53	29	18

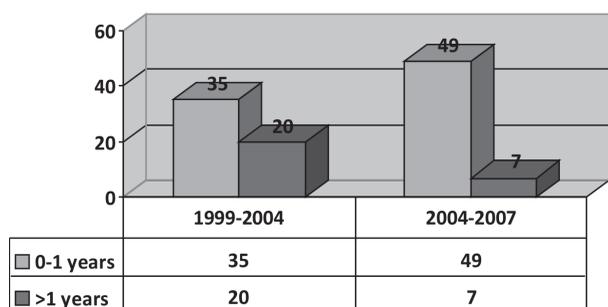
The incidence of risk factors is presented in Table 2. We found a greater risk for DDH in female babies born breech; 29 female babies versus two males (p<0.05).

Table 2: Risk factors for DDH.

	Breech delivery	Heredity	Firstborn	Other Pathologies
Cases	31	27	62	4
Percent	27.9	24.3	55.8	3.6

Main difference between the study periods was the percentage of babies treated before and after the age of one year. More babies were presented after 1 year of age during the first period of our study ($p < 0.004$).

Distribution of presentation age according to study periods is presented in Figure 1.

**Figure 1: Results of early diagnosis and treatment ($p < 0.004$).**

Distribution of selected treatment modality, conservative or surgical, showed no difference between the two study periods. Results are illustrated in Table 3. We underline that two of the surgical procedures of the children from the second group were extraarticular (derrotational osteotomies) and only one was an open reduction without osteotomy of the pelvic bones.

Table 3: Surgical vs. conservative treatment ($p = 0.06$).

	Surgical	Conservative	Total
1999-2004	9	46	55
2004-2007	3	53	56

If we divide the children in two age groups we can observe that we had no children operated under the age of one and 12 of them requiring surgery after this age. Also 61% of the children under age one were treated with the abduction pillow which we consider to be the simplest form of treatment (Table 4).

Table 4: Modalities of treatment by age groups.

	Becker-Mittelmeyer	Ilfield Splint	Plaster	Surgery
0-1 year	52	17	15	0
>1 year	1	4	10	12

Discussion

We believe that the strategy implemented by us in that district gave good results. The total number of children with DDH diagnosed after the age of one year was decreased from 36.3% to 12.5%. Although statistically not significant, distribution of main treatment modality, conservative or surgical, showed in increasing trend towards the conservative area after 2004. This is most probably due to the higher percentage of babies presenting before the age of 1 year.

The sensitization of the population together with the good cooperation between the different specialists dealing with DDH turned out to significantly reduce the number of cases diagnosed late. The coordination between different structures also has been of crucial importance. We must admit that we found the full understanding with the Health Authorities of the district and also the collaboration between the Maternity Hospitals, the Health Care Centers and the Orthopedic Department was excellent. Overpopulation of the big urban centers could be considered as an advantage because most of the births are delivered in the Maternity Hospitals of the major cities, equipped with ultrasound machines where prepared nurses and highly trained physicians work. In those hospitals it is easier to train the staff and also you can have better access in the newborn's clinical and imaging examination.

Ultrasound examination, which has been inserted for the first time as part of a precise protocol in our Country, was a very important issue, but we believe it shouldn't be used as a primarily screening tool because of the costs⁵ and the poor availability over the country. Combination of clinical and ultrasound tests would be the right choice^{9,10}. We still support the x-ray of the pelvis as a very good tool towards a clear diagnosis¹¹. Treatment in our cases produced the best results when early diagnosis was possible. The device classically used by us was the Becker-Mittelmeyer abduction pillow which provided very good results as confirmed by other national¹² and foreign studies.

Being aware that the age of one year is not the correct age to be called "early age" on the treatment of DDH we consider this as a first step towards a long and difficult way. We will propose Ministry of Health to introduce this strategy in the health care policies. Surely the results will be much better in the future once the strategies are created and maintained.

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