

ORIGINAL ARTICLE

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Evaluating the effectiveness of the national hip dysplasia early diagnosis and treatment program**Emre Ergen¹, Ersen Turkmen¹, Mehmet Fethi Ceylan¹, Mehmet Aslan², Selma Felek³**¹*Inonu University Faculty of Medicine, Department of Orthopaedics and Traumatology, Malatya, Turkey*²*Inönü University Faculty of Medicine, Department of Child Health and Diseases, Malatya, Turkey*³*Malatya Provincial Health Directorate, Malatya, Turkey*

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Abstract

A significant decrease in late diagnosis and requirement for surgical treatment have been observed due to the implementation of the National Developmental Hip Dysplasia (DDH) Early Diagnosis and Treatment Program, which has been in existence for about 10 years. However, patients with delayed diagnosis are still admitted to our clinic for treatment. In this study, we aimed to evaluate the effectiveness of this program and reveal its deficiencies. Patients and methods: Sixty-one patients diagnosed or treated for ddh later than six months of life were included in the study. Patients born between 2011 and 2014 (Group 1) and between 2015 and 2018, during which time the early screening program was performed intensively (Group 2), were compared. The patients' risk factors, whether a hip ultrasound (US) was performed, and the reasons for the delay in diagnosis and treatment were questioned retrospectively. The number of DDH patients in Group 2 decreased by approximately 3 times (45/16) ($p = 0.0009$). Although 37 (61%) patients had a hip US assessment within the first 6 months, their treatment was delayed, and normal USs were reported for 20 (33%) of them. Hip US was not performed in 24 (39%) patients within the first 6 months. The number of late-diagnosed and -treated babies with DDH decreased significantly in recent years, but this is not sufficient. Preventing late diagnoses should be the main goal. This study detected families' negligence and lack of information, family physicians' non-compliance with the program, and improper US assessment as the confounding reasons.

Keywords: Hip dysplasia, early diagnosis, hip ultrasound, screening program**Introduction**

Early diagnosis within the first few months of life should be the main goal in developmental hip dysplasia (DDH) [1]. When the diagnosis is delayed, the success of conservative treatment decreases and the need for surgical treatment increases. The incidence of DDH in our country is 5–10 times higher than the global average [2, 3]. Conducted since 2010, the National DDH Early Diagnosis and Treatment Program has resulted in a significant decrease in the number of DDH patients diagnosed later than 6 months in recent years. The aim of this selective screening program is to identify patients with DDH early to successfully treat them with conservative methods [4].

However, despite this program, patients who are diagnosed after the first six months of life apply to our clinic. Therefore, we conducted this study to evaluate the effectiveness of this program retrospectively. This is the first such investigation in our country.

Material and Methods

Permission from the Local Ethics Committee (Decision number: 2020/45) was obtained before the start of the study. One hundred and fifty-three pediatric patients born between 2011 and 2018, and who were registered in our hospital automation system and applied to our clinic for DDH treatment were examined retrospectively. Children who were diagnosed and treated with hip ultrasound (US) within the first six months and who suffered from neuromuscular disease and congenital hip dislocation were not included in our study. In addition, those who were referred from outside the city and refugees were excluded from our study. Sixty-one children who were diagnosed and treated with DDH after six months of age, and who had lack of treatment despite US assessment before six months were included in our study.

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Information about children with DDH was obtained from hospital records, family physicians, and parents. Questions were asked about the requirement for a hip US in the first six months, DDH risk factors, hip US screening percentage, live birth rate, and number of family physicians in the city. Swaddle use, breech delivery, positive family history, first female baby, prematurity, and accompaniment of metatarsus adductus or torticollis were considered as risk factors. In addition, family physicians were asked about the problems they encountered regarding the early screening of DDH and their suggestions for solutions.

According to the data of the Provincial Health Directorate, early scanning with hip US within the scope of the DDH Program was started intensively (74%) in 2014 (Table 1). It is well known that patients with late-diagnosed DDH will apply to orthopedic clinics for treatment after about a year [5]. Therefore, we categorized these patients in two groups: The 1st Group was characterized by low early screening between 2011 and 2014, and the 2nd Group underwent intensive screening between 2015 and 2018. Chi-squared and Fisher–Irwin tests were used to compare the proportions of these two groups [6]. $P < 0.05$ values were considered as statistically significant.

Table 1. Distribution of hip US screening percentage, live birth rate, number of family physicians in the city, and treatments applied to 61 patients by year.

	1st Group				1st Group			
Years	2011	2012	2013	2014	2015	2016	2017	2018
CR	6	-	4	4	2	3	1	1
OR	7	7	4	6	4	2	1	2
CR+OR	1	2	3	1	-	-	-	-
TOTAL	14	9	11	11	6	5	2	3
FP	204	204	213	214	234	244	256	267
Live Birth	12.190	12.214	11.931	12.313	11.993	11.738	11.728	11.175
% US S	5	10	10	74	85	84	72	94,7
1st Group: 14 CR, 24 OR, 7 CR+OR= 45					2nd Group: 7 CR, 9 OR= 16			

CR: Closed reduction; OR: Open reduction; CR+OR: OR after CR; FP: Number of family physician in the city; % US S: Percentage of hip US scanning

Results

Distribution of hip US screening percentage, live birth rate, number of family physicians in the city, and the treatments applied

to the 61 patients by year are presented in Table 1. The difference between the proportions of patients in the two groups (73.8%, $n = 45$ vs. 26.2%, $n = 16$; difference = 47.6%) was found to be statistically significant ($p = 0.0009$).

Although 37 (60.66%) patients underwent hip US examination within the first 6 months, their treatment was delayed. In 9 (14.75%) of them, the treatment delay was attributed to family negligence. In 20 (32.79%) patients, the hip US examination was reported as normal (Figures 1 and 2). In eight (13.12%) patients, treatment was delayed because they were followed up for a long time with inappropriate conservative treatments, such as double diaper application.

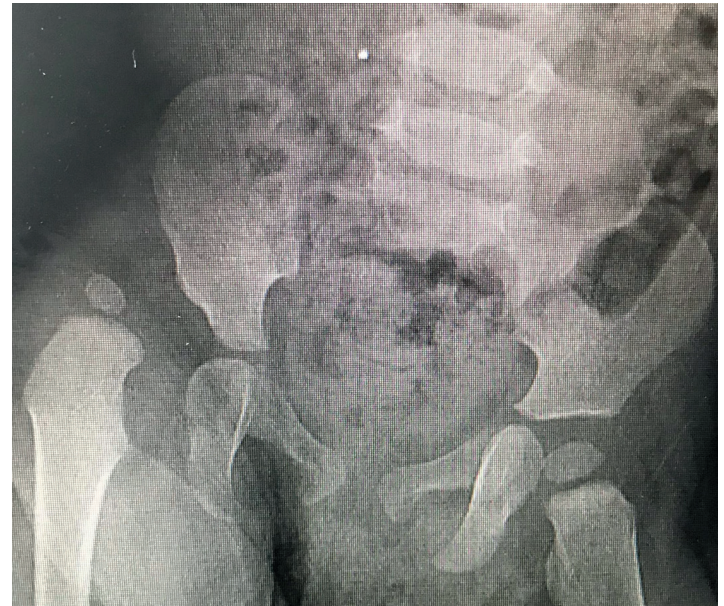


Figure 1. Preoperative radiography of a 20-month-old patient whose hip US assessment was reported as normal (According to the Graf method, the result of the hip ultrasound report of this patient at the 2nd month, Type 1a; no image)



Figure 2. Follow-up radiography of the same patient in the 2nd year after surgery

In 24 (39.34%) patients, hip US was not performed within the first 6 months. In 9 (14.75%) of them, family physicians verbally warned the families regarding hip US examination, but the families neglected their advice. However, the automation systems of these family physicians did not contain written records about any patient on this subject. The family physicians provided neither verbal nor written warnings to the other 15 (24.59%) patients.

The family physicians emphasized that the families did not attend hospitals or health centers for US examination for babies born from the beginning of March 2020 for the early diagnosis of DDH due to the pandemic caused by the coronavirus disease 2019 (COVID-19). In addition, requests for more training courses on DDH were received.

One family stated that the hip US examination could not be performed because the US device was defective, while another resided in a rural area, and hence, it was not possible to bring the child for the hip US assessment. Thirty-five (57%) patients had at least one risk factor, and 27 (44%) families reported using swaddling.

Discussion

Early DDH screening can be conducted very conveniently, and when diagnosed early, it is possible to fully treat it with non-surgical methods. Countries such as Germany and Austria, where DDH prevalence used to be as high as that in our country, reduced the frequency of patients requiring surgical treatment to under 1/1000 with early screening studies [7]. Notably, the significant decrease in the number of patients requiring surgical treatment in our city is attributable to the early screening study performed in recent years, but patients who are still neglected apply to our clinic for treatment.

As shown in other studies from the same country, parents of children with DDH were unaware about warnings regarding hip evaluation with US and swaddle use [2, 8]. This study found that diagnosis and treatment of 18 (30%) patients were delayed due to negligence on part of their families, and that swaddling was applied to babies of 27 (44%) families. It may be helpful to inform parents via different media tools about the importance of not using swaddling and of performing a hip US for early DDH screening [2].

Our country implements a selective early screening program, wherein babies at risk of DDH are identified by family physicians. Therefore, family physicians should examine all newborn babies and identify those at risk by seeking information about the risk factors before referring them for a hip US examination [4]. However, according to our results, family physicians only verbally directed the families of all newborns for hip US examinations. It is important to note that medico-legal problems may arise due to the absence of written documents [9]. Also, physicians should follow up with the parents of babies at risk of DDH about the results of the hip US to reduce instances of family negligence. A family physician in the city sees approximately four newborn babies per month for the early DDH screening, and this number is judged to be appropriate (Table 1). In addition, the surveyed family physicians stated that families have not taken their babies to hospitals for hip

USs since March 2020 due to the COVID-19 pandemic. It is very important that these children be identified and redirected for a hip US assessment. Otherwise, a considerable increase in the number of patients diagnosed with DDH late next year is inevitable.

The results of this study also revealed that normal reports of hip USs obtained in the first three months for approximately one-third of the patients should be investigated in detail with the Graf method. Graf listed the various possible errors in interpreting hip USs [10]. The lack of images in hip US reports makes it difficult to pinpoint the exact location of the problem. Thus, US images should be compulsorily added to the reports. Furthermore, facilitating hip US examinations of patients, especially those referred from rural areas, might prevent late diagnosis in some patients.

The experts who will undertake the treatment of babies detected with DDH as a result of the early screening project and the institutions they will be directed to remain to be determined [4]. This study still encountered patients who were followed up for a long time with incorrect applications, such as double diapers, by specialist physicians. In order to prevent such misapplications, DDH clinics should be set up with sufficient numbers of pediatric and/or orthopedics specialists. Previous studies have recommended that physicians be careful about the early diagnosis of DDH [11–13]. It is therefore recommended that specialist associations continue their educational activities in order to increase physicians' knowledge about the current diagnosis of DDH and its treatment.

This study suffers from some limitations. It is retrospective, and the results do not reflect the situation for the entire country. In addition, we could not evaluate patients who were born in our city and migrated to other cities after the first 6 months of life. Thus, additional well-designed prospective studies on this subject are required.

In summary, the National DDH Early Diagnosis and Treatment Program coordinated by the Ministry of Health in the city helped decrease the number of children with late-diagnosed DDH who required surgical treatment by three-fold. Although this result is encouraging, more needs to be done; it is crucial to detect all DDH cases in a timely manner by raising the efficiency of the program and eliminating preventable late diagnoses and treatments altogether.

Conflict of interests

The authors declared they do not have anything to disclose regarding conflict of interest with respect to this manuscript.

Financial Disclosure

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Ethical approval

Permission from the Local Ethics Committee (Decision number: 2020/45) was obtained before the start of the study

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