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Do Developmental Dysplasia of the Hip Risk Factors Affect the Prognosis of Graf Type 2a Hip?

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Abstract

Objective: Developmental dysplasia of the hip is usually asymptomatic in infancy. Detection of risk factors is important. The aim of this study was to determine the effect of known risk factors for worsening and transition to type 2b hip in patients with Graf type 2a.

Methods: Patients diagnosed with Graf type 2a between 2014 and 2018 were analyzed retrospectively. Patients diagnosed with Graf type 2a dysplasia were divided into 2 groups as healed (group 1) and type 2b hips that needed treatment (group 2). Ninety-seven hips of 69 patients in group 1 and 75 hips of 50 patients in group 2 were evaluated. The groups were compared in terms of risk factors (gender, mode of delivery, family history, first birth, and fetal presentation) determined for developmental dysplasia of the hip.

Results: One hundred seventy-two type 2a hips of 119 patients were evaluated. No significant difference was found between the groups in risk factors (gender, family history, first birth, mode of delivery, and fetal presentation) ($P > .05$). There was no significant difference between the groups in terms of initial alpha and beta angles ($P > .05$). The age of patients in group 1 at the time of diagnosis was significantly lower than that of group 2 ($P = .026$).

Conclusion: We observed that various risk factors known to be effective in hip dysplasia were not effective in the transition from type 2a to type 2b. In addition, a lower rate of improvement can be expected in Graf type 2a hips approaching the third month compared to the patients in the early period.

Keywords: Graf type 2a hip, Graf type 2b hip, developmental dysplasia of the hip, transition to type 2b from type 2a, risk factors for Graf type 2b

Introduction

Developmental dysplasia of the hip (DDH) is one of the most common musculoskeletal problems in infants.[1] Developmental dysplasia of the hip is usually an asymptomatic problem, and it is difficult to detect by examination in newborns. The imaging methods are used as the scanning methods to detect DDH. Lack of femoral head ossification in postnatal period restricted the use of direct radiographs for early diagnosis. For this reason, the classification method made by ultrasonography (USG) defined by Graf in 1980 has become popular and is still used today. Graf type 2a is described as an alpha angle of 50°-59° and a beta angle of 55°-77° in hip USG performed in the first 3 months after birth.[2] The deterioration rate in patients defined as type 2a according to the Graf method in the initial USG varies from 3% to 20% in the literature.[3,4] It is recommended to continue the ultrasonographic follow-up of the dysplastic hips until they return to normal.

Early diagnosis of DDH and initiation of treatment greatly increase the chances of success.[5,6] Therefore, hip USG is recommended as a screening method to detect DDH at 1 month after delivery.[7] It is also known that risk factors affect the development of DDH. The aim of this study was to determine the risk factors for worsening and transition to type 2b hip in patients with Graf type 2a.

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Methods

In our study, the records of patients who applied to the orthopedics clinic between 2014 and 2018 and diagnosed with hip dysplasia as a result of USG were reviewed retrospectively. Patients diagnosed with Graf type 2a dysplasia were included in the study. After the diagnosis of the patients, USG was performed every 3 weeks for follow-up. Patients who had dysplasia after the 3rd month or whose alpha angle was below 55° from the beginning were applied with a pavlik bandage. Patients with congenital anomaly and neuromuscular disease, without medical records and follow-up, were excluded from the study. All USGs were performed by experienced radiologists.

Patients diagnosed with Graf type 2a dysplasia were divided into 2 groups as healed (group 1) and type 2b hips that needed treatment (group 2). The groups were compared in terms of risk factors (gender, mode of delivery, family history, first birth, and fetal presentation) determined for DDH. Clinical examination was performed in all children. Our study was approved by the local Ethics Committee (Approval Date/Number: 21.10.2021/GOKA/2021/17/10)

Statistical Analysis

Statistical analysis was performed using the Statistical Package for Social Sciences software version 21 (SPSS Inc., IBM, NY, USA). Categorical variables were given with frequency and percentage; continuous numerical variables were given with median (minimum; maximum). The chi-square test was used to compare frequencies. Comparison of the risk factor between groups was performed by independent samples *t*-test. *P*-values lower than .05 ($P < .05$) were considered statistically significant.

Results

No abnormal examination findings were detected in the clinical evaluation in all children. In the study, 172 type 2a hips of 119 patients (95 girls, 24 boys) were evaluated. Seventy-nine percent of patients in group 1 and 80% of patients in group 2 are female. Patients were affected 45% bilaterally and 55% unilaterally. The data are summarized in Table 1. No significant difference was found between the groups in gender, family history, first birth, mode of delivery, and fetal presentation. The mean age at the time of diagnosis was 2 months in group 1 and 2.5 months in group 2. The mean age at diagnosis of patients in group 1 at the time of diagnosis was significantly lower than that of group 2 (P = .026). When initial USG values were compared, there was no significant difference between the groups in terms of alpha and beta angles (P = .124 and .684, respectively).

Discussion

The development of the hip continues in the postpartum period and may return to normal in the later periods even if the hip is not normal in the newborn. It is known that the hips of some babies, whose hip development is insufficient in the first days of life, normalized by 90% in the sixth week.[8] As the babies grow, hip development may return to normal, but if the hip development does not progress in parallel with the growth of the baby, the bad outcome can be predicted.[9] One of the findings in our study is that the children who healed in type 2a hips had significantly lower mean USG months than those who worsened. The first USG was performed at a mean of 2 months in healed hips, compared to an average of 2.5 months in deteriorating hips. This finding, it can be interpreted that we can expect improvement in type 2a hips approaching 3 months with a low probability.

In the case of Graf type 2a hips, if the alpha angle is above 55°, follow-up is recommended in the first 3 months and if it does not reach the normal level, treatment is recommended.[1,10,11] In addition, Bilgili et al[12] reported that hips of Graf type 2a below 55° worsened. In our study, contrary to the literature, the mean alpha angle of both groups was 55°, and no significant difference was found between the healing and worsening hips.

Table 1. Comparison of Group Data

	Group 1 (97 Hips of 69 Patients)	Group 2 (75 Hips of 50 Patients)	*P*
Age at the time of diagnosis (months)	2.0 ± 1.1	2.5 ± 1.7	.026
Gender (female/male)	55/14	40/10	.968
Side (right/left)	49/48	43/32	.374
Family history (+/–)	15/54	13/37	.588
First birth (+/–)	15/54	13/37	.588
Delivery mode (vaginal/cesarean)	34/35	24/26	.890
Fetal presentation (head/breech)	66/3	46/4	.403
USG alpha angle (°), mean ± SD	55.9 ± 2.8	55.2 ± 2.9	.124
USG beta angle (°), mean ± SD	52.8 ± 5.1	53.3 ± 7.3	.684

USG, ultrasonography.

It is difficult to detect the presence of DDH by examination in newborns.[13,14] For this reason, it is important to find risk factors in DDH to detect the presence of DDH, and many studies have been conducted on this subject and a relationship has been found between many risk factors and DDH.[15-17] One of the aims of our study was to determine the effect of risk factors on DDH. In our study, it was shown that the main risk factors determined for DDH did not affect the worsening of type 2a hips. This finding indicates that risk factors are not predictive of disease progression.

We examined the rate of worsening of type 2a hips. Ömeroğlu et al[2] examined the natural course of type 2a hips and reported that 35 hips (12%) did not improve at 12 weeks and needed treatment, but in this study, the hips healed with these patients were not compared. Kosar et al[11] reported 5.6% worsening in their study in which they examined the risk factors of worsening of type 2a hips; instability, central nervous system anomaly, and unilaterality were found to be risk factors. We did not include patients with neurogenic anomalies in our study because we are already expecting worsening in these children, and we had a worsening rate that was more than that previously found in the literature (43.6%). The reason for this high rate may be that the hips were reported as improvement by the radiologists after returning to normal and the patients did not apply to the orthopedic outpatient clinic.

Early diagnosis and early treatment may be effective in the progression of the disease. Recovery can be expected with a low probability in type 2a hips approaching 3 months. In addition, known risk factors for DDH are not effective in transitioning from type 2a to type 2b. More studies are needed to investigate the effect of risk factors.

Ethics Committee Approval: Ethical committee approval was received from the Ethics Committee of Samsun Education and Research Hospital, University of Health Sciences (Date: October 21, 2021, Approval No: GOKA/2021/17/10).

Informed Consent: Written informed consent was obtained from all participants who participated in this study.

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