

Our Four-Years Results of Developmental Hip Dysplasia Screening Program in Newborns

Yenidoğanlarda Dört Yıllık Gelişimsel Kalça Displazi Tarama Sonuçlarımız

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ABSTRACT Objective: To share the results of a developmental dysplasia of the hip screenings programmes and discuss the topic within the framework of current literature. **Material and Methods:** A total of 2653 newborns, who were born in our clinic between 14th January, 2006 and 25th September, 2010 were enrolled in the study and 2541 of the babies had their ultrasonography tests done. However, the remaining 112 were excluded from the study because they did not continue outpatient follow up care at the hospital. The intervention group (n=2653) was screened by an ultrasound examination of the hip at the age of 4-5 weeks and the ultrasound examinations were performed by radiologists using Graf's method. **Results:** Of the infants included in the study, 1311 (51.6%) were girls, 1230 (48.4%) were boys, 2413 were type I a hips (94.9%), 113 were type II a hips (4.4%), 8 were type II c hips (0.31%), 4 were type II d hips (%0.15), and 3 were bilateral type III a hips (0.11%). Type I a infants were not followed. Infants with hips designated as type II c and above were referred to orthopedics and immediate treatment was initiated (Pavlik harness). Type II a infants were re-evaluated a month later with ultrasonography, and all results were type I a. Among the infants who were observed and referred to orthopedics (n=128), sixty nine (53.9%) carried at least one of the following risk factors such as being female, born with breech presentation, member of multiple gestation or a history of oligohydramnios. However, 59 infants (46.1%) had no risk factors. Physical findings such as asymmetry of gluteal and thigh skin folds, abnormal feet deformity, limitation of hip abduction or torticollis were detected in 36 (28%) cases. However, 92 (72%) cases had normal physical examination and one of the cases needed surgical intervention. **Conclusion:** In order not to fail to diagnose the DDH, it is very important to perform USG within the first months of life in all newborns to decrease the morbidity. It is socially and judicially important for physicians, especially for those who are following babies born in distant provinces, where no radiologists are available or accessible, to perform the relevant examinations more meticulously and carefully.

Key Words: Infant, newborn; morbidity; hip dislocation, congenital; ultrasonography

ÖZET Amaç: Gelişimsel kalça displazi tarama programı sonuçlarımızı bildirmek ve güncel literatür eşliğinde tartışmak. **Gereç ve Yöntemler:** Çalışmaya 14 Ocak 2006 ve 25 Eylül 2010 tarihleri arasında doğan 2653 yenidoğan dâhil edildi. 112 yenidoğan hastanemize devam etmediği için çalışma dışı bırakıldı. 2541 bebeğin kalça ultrasonografileri ilk bir ay içinde (4-5 haftalık) radyologlar tarafından yapıldı ve Graf metoduna göre değerlendirildi. **Bulgular:** Bebeklerden 1311 (%51,6)'i kız, 1230 (%48,4)'u erkek idi. Olgulardan 2413 (%94,9)'ünde tip I a, 113 (%14,4)'ünde tip II a, 8 (%0,31)'inde tip II c, 4 (%0,15)'ünde tip II d ve 3 (%0,11)'ünde de bilateral tip III a tespit edildi. Tip I a'lar izlem dışı bırakıldı. Tip II c ve üstü kalçalar ortopediye sevk edildi ve tedavilerine başlandı (pelvik bandaj). Tip II a'lar ise takip edilerek bir ay sonra yapılan kontrol ultrasonografilerinde sonuçlar tip I a olarak değerlendirildi. Takibe alınan ve ortopediye sevk edilen (n:128) olgulardan 69 (%53,9)'unda; kız bebek, makat geliş, çoğul gebelik ve oligohidramniyoz gibi risk faktörleri belirlenirken, 59 (%46,1)'unda ise herhangi bir risk faktörü saptanamadı. Pili asimetrisi, ayak deformitesi, abduksiyon kısıtlılığı ve tortikolis gibi fizik bulgular 36 (%28) olguda tespit edilirken, 92 (%72) olgunun fizik muayenesi normaldi. Cerrahi müdahale gerektiren olgu olmadı. **Sonuç:** Gelişimsel kalça displazilerinin atlanmaması için tüm yenidoğanlarda ilk aylarda kalça ultrasonografisinin yapılması morbiditeyi azaltmakta olup, radyoloji uzmanının olmadığı veya ulaşılmadığı merkezlerde, yenidoğan bebeklerin takibini yapan hekimlerin bu konuda daha titiz ve özenle hareket etmesi, sosyal ve adli açıdan önem arz etmektedir.

Anahtar Kelimeler: Bebek, yenidoğan; morbidite; kalça çıkığı, doğumsal; ultrasonografi

Developmental dysplasia of the hip (DDH) is a condition, which involves an interrupted relation between the femoral head and the acetabulum caused by no specific reason such as a neuromuscular disease or trauma. This condition could occur in any of the embryonic, fetal or infantile periods.¹ Lack of diagnosis during the neonatal and infantile periods can be an important cause of morbidity.²⁻⁴ Complicated surgical interventions are needed in cases diagnosed after age one and the success rate is quite low. Therefore, DDH-screening programs are needed and conducted in many countries. Ultrasound examination of the hip (USG) on the newborns has first been systematically used by Graf in 1980.⁵ In our clinic, all newborns undergo ultrasonographic screening for DDH, when they are 4-5 weeks old. This study was designed to assess the results of a developmental dysplasia of the hip screening program that was conducted in our clinic for four years and discuss the topic within the framework of current literature.

MATERIAL AND METHODS

There were 2653 newborns, who were born at our clinic between 14th January, 2006 and 25th September 2010 and ultrasound examination of the hip was performed for all the 2653 newborns. Of all the infants 2541 had their USG tests done but the remaining 112 were excluded from the study because they did not continue outpatient follow up care at the hospital. When the newborns were 4 to 5

weeks old, they underwent hip USG and the ultrasound examinations were performed with a 4-9 MHz linear probe. During the examination, the baby was laid at 15-20° rotation in a lateral decubitus position and the hip and knee were held at semi-flexion. The Graf's method (Table 1) and dynamic USG were used for evaluation.⁶ In babies with DDH of type II a hips and above (worse) detected by USG screening, the following risk factors such as positive family history, female gender, breech presentation, presence of abnormal feet deformity, torticollis, being the first born baby, oligohydramnios, findings regarding intrauterine compression such as multiple gestation. were questioned and their physical examinations were repeated accordingly. Sensitivity between the ultrasonography and physical examination, their specificity and positive and negative predictive values were considered in the findings. The patients were informed and they expressed their consent. In addition to this, ethical approval was obtained from the Ethical Committee of Fatih University.

RESULTS

Among the cases included in the study, 2413 were type I a hips (94.9%), 113 were type II a hips (4.4%), 8 were type II c hips (0.31%), 4 were type II d hips (0.15%) and 3 were bilateral type III a hips (0.11%) but infants with type I a hips were not followed (Table 2). Infants with type II c hips and worse were referred to orthopedics. Type II a in-

TABLE 1: Ultrasonographic hip typing according to the Graf's classification system.⁶

Type	Description	α angle (o)	β angle (o)
I	Mature (normal) hip	≥ 60	la: < 55 b: ≥ 55
Ia	Physiological delay in maturation (<3 months of age)	50-59	55-77
Ib	Pathological delay in maturation (>3 months of age)	50-59	55-77
Ic	At-risk or critical hip	43-49	≤ 77
IId	Hip on the point of dislocation (decentric)	43-49	> 77
III	Dislocated hip	< 43	> 77
	III a: No disturbance in the structure of the cartilaginous acetabular roof		
	III b: Disturbance in the structure of the cartilaginous acetabular roof		
IV	Highly dislocated hip	< 43	> 77

TABLE 2: Distribution of the results of hip ultrasonography

DDH types	n	%
Type Ia	2413	94.9
Type IIa	113	4.4
Type IIb	0.0	0.0
Type IIc	8	0.31
Type IId	4	0.15
Type IIIa	3	0.11

DDH: Developmental hip dysplasia.

TABLE 3: Distribution of the risk factors and physical signs of cases that were referred to orthopedic department.

Risk factors	N (128)	%
Risk factor not determined	59	46
Risk factor determined	69	54
Female gender	32	25
Breech presentation	20	15.6
Multiple pregnancy	12	9.3
Oligohydramnios	5	3.1
Physical signs	N (128)	%
Normal physical examination	92	72
Signs of physical examination	36	28
Asymmetry of gluteal and thigh skin folds	14	10.9
Foot deformity	10	7.8
Limitation of abduction	8	6.2
Torticollis	4	3.1

infants were re-evaluated a month later with ultrasonography, and all results were type I a. Sixty nine (53.9%) of the infants who were observed and re-

ferred to orthopedics (n=128) carried at least one of the following risk factors: being female; 32 (25%), born with breech presentation; 20 (15.6%), member of a multiple gestation; 12 (9.3%) or a history of oligohydramnios; 5 (3.9%), whereas 59 infants (46.1%) had no risk factors. Asymmetry of gluteal and thigh skin folds; 14 (10.9%), abnormal feet deformity; 10 (7.8%), limitation of abduction; 8 (6.2%) and torticollis; 4 (3.1%) were detected during physical examination. (totally 36 cases; 28%). In 92 (72%) of the cases, the physical examination was normal (Table 3). In the diagnosis of DDH, the sensitivity of physical examination at 60 %, the specificity at 76%, the positive predictive value at 25% and the negative predictive value at 93% were calculated (Table 4). None of the cases needed surgical intervention.

DISCUSSION

There are various data on the DDH prevalence in the world and the rates reported vary between 0.8% and 2%.⁷⁻¹¹ Relevant studies in Turkey report the DDH prevalence as 0.5%-1.5%.¹²⁻¹⁴ In our study, the prevalence was found as 0.4%. These differences are not only due to genetic and racial characteristics, but also to socio-economic status; regionally differing according to living conditions and traditions. The sensitivity of diagnostic methods also affects the prevalence rate.¹⁵ Positive family history, female gender, breech presentation, presence of abnormal feet deformity, torticollis, being first born baby, oligohydramnios, findings regarding intrauterine compression such as multiple gestation are among the risk factors of DDH. However, no risk factors

TABLE 4: The relationship between physical examination findings and ultrasound results.

	Ultrasound results positive for DDH	Ultrasound results negative for DDH
Physical examination findings positive	9 (true positive)	27 (false positive)
Physical examination findings negative	6 (false negative)	86 (true negative)

DDH: developmental dysplasia of the hip
 Ppv (positive predictive value) = TP/(TP+FP): 9/ (9+27)=0,26 = %26
 Npv (negative predictive value) = TN/(TN+FN):86/(86+6)=0,93=%93
 Sensitivity = [TP/(TP+FN)]x100=9/(9+6) x100=%60
 Specificity = [TN/(TN+FP)]x100=86/113)x100=%76
 TP: true positive, TN: true negative, FN: false negative, FP: false positive,

were detected in more than 60% of the cases.^{16,17} In the present study, 56 (46%) of the infants, who were followed and referred to orthopedics, presented with no risk factors. Although, physical findings like abnormal feet deformity and posture changes detected in physical examination have a direct correlation with DDH, they are regarded as weak risk factors.¹⁶ In our study 92 (72%) of the infants who were followed and referred to orthopedics presented with no abnormality in their physical examinations at the beginning. Studies show that there may be many DDH cases, with no risk factors and no pathologies during physical examination.^{18,19} In our study, no risk factors or abnormal physical examination findings were detected in approximately half of the cases referred to orthopedics (type IIc hips and worse; 6/15 infants). Physical examination findings for diagnosis of DDH alone are usually in-

adequate.²⁰ In the diagnosis of developmental dysplasia of the hip, the sensitivity of physical examination (60 %), its specificity (76%), the positive predictive value (25%) and the negative predictive value (93%) were determined in our study. It is reported that the ideal timing of the hip USG is the first 3-5 weeks after the birth and we evaluated our cases with hip USG after the completion of the first month of birth.²¹

In conclusion, in order not to fail to diagnose the DDH and to decrease the morbidity, it is very important to perform USG within the first months of life in all newborns to decrease the morbidity. It is socially and judicially important for physicians, especially for those who are following babies born in distant provinces, where no radiologists are available or accessible, to perform the relevant examinations more meticulously and carefully.

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