RISK FACTORS FOR DEVELOPMENTAL DYSPLASIA OF THE HIP: RESULTS FROM 1025 NEONATES

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ABSTRACT

Objective: *To assess the relationship between the risk factors and the prevalence of developmental dysplasia of the hip (DDH).*

Material and Method: *Between August 2010 and March 2011, a single orthopedic surgeon examined 1025 neonates using hip ultrasonography according to the Graf technique. Records of ultrasonographic examination and risk factors were compared. Clinical examination was performed, but findings were not taken into consideration.*

Results: *The mean birth age was 38.3±2.1 (range, 26–42) weeks and the mean birth weight was 3.2±0.6 (range, 0.8–4.4) kg. Most (94.4%) births were single, 5.5% were twins, and 0.3% were triplets, with55.9% boys and 44.1% girls. The mean age at presentation was 1.7±1.3 (range, 0.3–9) months. Two hundred and twenty-one births were normal and 804 were by caesarean section. DDH prevalence was significantly higher in girls than in boys.*

Conclusion: *Multiple pregnancy, birth type, and being the first child did not correlate with DDH prevalence, and are thus not considered to be risk factors.*

Keywords: *Dysplasia, hip, screening, ultrasound, newborn.*
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GELİŞİMSEL KALÇA DİSPLAZİSİ RİSK FAKTÖRLERİ: 1025 YENİDOĞANIN SONUÇLARI

ÖZET

Amaç: Gelişimsel kalça displazi (GKD) prevelansı ile risk faktörleri arasındaki ilişkiyi belirlemek

Materyal ve Metot: 1025 yenidoğana Graf tekniği kullanılarak aynı ortopedi uzmanı tarafından kalça ultrasonu uygulandı. Ultrasonografik değerler ve risk faktörleri karşılaştırıldı. Fizik muayene bulguları çalışmadan bağımsız olarak değerlendirildi.

Bulgular: Ortalama doğum yaşı 38.3±2.1 (26–42 hafta ve ortalama doğum ağırlığı 3.2±0.6 (0.8–4.4) kg idi. Doğumların çoğu tek bebek (%94.4) %5.5 'i ikiz ve %0.3'ü üçüzdü. Yenidoğanların %55.9'u erkek, %44.1'i kızdı. Değerlendirme ortalama 1.7±1.3 (0.3–9) aylıkken yapıldı. Doğumların 221'i normal, 804'ü sezeryandı. GKD prevelansı kızlarda erkeklerden anlamlı olarak yüksekti.

Sonuç: Çalışmamıza göre çok sayıda doğum, doğum tipi ve ilk çocuk olma GKD prevelansı ile korele olmayıp risk faktörü olarak düşünülmemiştir.

Anahtar kelimeler: Displazi, kalça, görüntüleme, ultrasonografi, yenidoğan. **Nobel Med 2017; 13(2): 76-79**

INTRODUCTION

Developmental dysplasia of the hip (DDH) is a disorder that can result in inadequate coverage of the femoral head. Patients with DDH may present with instability and subluxation or dislocation of the hip. When ignored or left untreated, this disorder may lead to severe sequelae requiring invasive treatment modalities in the late period. Thus, the diagnosis of DDH in early infancy is essential. Barlow and Von Rosen first described the early diagnosis of DDH using clinical examination.[1,2] Since Graf introduced hip ultrasonography in 1980, this modality has been incorporated in current medical practice.[3] In some countries, ultrasonographic screening is selective, applied only in cases with risk factors, whereas a universal screening program is applied in other countries.[4,5,6]

Universal screening is more sensitive for the detection of DDH than is clinical examination alone or selective screening, but it may generate false-positive results leading to overtreatment, which may cause complications such as femoral-head avascular necrosis. Selective screening has been shown to produce fewer false-positive results, but its effectiveness depends on the appropriate consideration of clinical signs and risk factors.[7] Risk factors for DDH have been well described in the literature, but systematic knowledge of them is limited. Certain risk factors requiring ultrasound assessment of the neonate have been identified. These are breech presentation, multiple pregnancy, birth type, primiparity, neonate's sex, oligohydramnios, and familial history. The appropriate determination of risk factors is essential for selective screening programs for DDH.

The purpose of our study was to determine the relationships between risk factors and DDH prevalence, and to compare our results with the literature.

MATERIAL AND METHOD

All neonates borned in our hospital were screened ultrasonographically using the Graf method, independent of the presence of risk factors (Table 1). Neonates with neuromuscular disorders and skeletal deformities were excluded from this analysis. Families were informed of the study objectives and procedures, and consent forms were obtained. After ultrasonographic examination, parents were asked about risk factors and their responses were recorded. Ethical committee of our hospital approved this study (22.07.2014-47/C). The results were analyzed using SPSS software (statistical package, version 19.0.; SPSS Inc., Chicago, IL, USA) and dependent parameters were compared using the Mann–Whitney U-test.

RESULTS

A total of 573 boys and 452 girls were examined, including 27 multiple pregnancies. The mean birth age was 38.3±2.1 (range, 26–42) weeks and the mean age at the time of ultrasound examination was 1.7±1.3 (range, 0.3–9) months (Table2). The majority (63.8%) of neonates were first born. 78.4% of births were caesarean and 21.6% were normal delivery. Graf type IIa DDH was detected in 11 hips, and types IIb, III, and IV were identified in one hip each (Table 3). Three hips were pathological, yielding a DDH prevalence of 0.29%. One male neonate had a positive family history, but his hips were ultrasonographically classified as type Ib DDH. The prevalence of DDH prevalence was significantly higher in girls than in boys (p=0.026).

Table 1. Graf method of DDH diagnosis and treatment classification. Type IIb and more severe hips were considered pathologic[5]. 78.4% of births were caeserian and 21.6% were normal delivery.

Type	α angle	β angle	Description	Treatment
I	>60	<55	Normal	none
IIa	50-60	55-77	Immature(<3 months)	Observation
IIb	50-60	55-77	>3 months	Pavlik bandage
IIc	43-49	>77	Acetabulardisplasia	Pavlik bandage
IId	43-49	>77	Inverted labrum	Pavlik bandage
III	<43	>77	Inverted labrum	Pavlik bandage
IV	Nonmeasurable	Nonmeasurable	Dislocation	Pavlik bandage or open reduction

Table 2. Demographic charesteristics of cases

	n=1025	Percent(%)
USG application time	1.7±1.3	
Birth week	38.3±2.1	
Weight	3.2±0.5	
Normal delivery	221	21.6
Caesarean section	804	78.4
First child	654	63.8
Second child	289	28.2
Third child	64	6.2
Forth child	16	1.6
Sixth child	2	0.2
Single	968	94.4
Twin	54	5.3
Triplets	3	0.3

USG: Ultrasound

Table 3. Ultrasographic hip types according to Graf method.

	Right hip	Percent	Left hip	Percent
Type I	1018	99.3	1018	99.3
Type IIa	5	0.5	6	0.6
Type IIb	1	0.1	0	0
Type III	1	0.1	0	0
Type IV	0	0	1	0.1

DISCUSSION

DDH is among the most commonly detected musculoskeletal disorders in neonates, with an estimated incidence of 1.4–35/1000 live births.[5,8,9] In northwestern Europe, North America, and Australia, the hip dislocation rate is 1–2/1000 live births.[10] We detected 12 mild forms (type IIa/b) of DDH among 1025 cases. In western countries,the mild form occurs in 40–60/1000 live births.[11,12] In contrast, in Japan, known to have the highest prevalence of DDH in the world, about 50% of adult hips receiving reconstructive surgery are dysplastic or dislocated.[13] DDH previously occurred in11–35/1000 live births in Japan, and intensive campaigns have reduced the frequency of this disorder to 2–3.1/1000 live births.[13]

Several reports have examined the prevalence of DDH in our country. Primiparity, breech presentation, positive family history, multiple pregnancies, oligohydroamnios and other intrauterine anomalies have been reported as risk factors of DDH. In any study it has not given the correlation of these factors with DDH in Turkey but our study did this.

Tomak *et al*. ultrasonographically screened 500 hips of 250 neonates admitted to an orthopedic clinic 1–30 days after birth, and detected type IIb DDH in seven neonates, type IIc in six neonates, type III in two neonates, and type IV DDH in three neonates (DDH prevalence=3.6%).[14] Tümer and Ömeroğlu reported DDH prevalences of 1.25–1% based on physical examination alone and 0.86–7.2% based on physical and radiographic examination.[15] Seker *et al*. evaluated 352 hips of 176 1–6-month-old babies by ultrasonographic examination, independent of the presence of risk factors.[16] They found type IIb (severe) DDH in 13 cases and reported a DDH prevalence of 37%.[16] Songür *et al*. radiographically screened 3723 children aged 6 months to14 years in 35 cities, and reported a DDH prevalence of 5.9%.[17] We found three pathological hips among 1025 hips (0.29%) during screening that was independent of the presence of risk factors (Table 3).

A meta-analysis of 31 studies of DDH risk in children aged <6 months found that the following risk factors were identified: left hip (n=10 studies), caesarean delivery (n=4), positive family history (n=4), first delivery (n=5), breech position (n=15), and female sex (n=24).[18] Our results are comparable with the findings of the meta-analysis only for female sex. We found that first delivery, breech position, and multiple pregnancy did not increase the risk of DDH. The present study had several limitations. A single orthopedic surgeon performed all ultrasonographic examinations in the same hospital, and most (78.4%) deliveries were by caesarean section.

Chan *et al*. reported that caesarean delivery entailed no risk of DDH in the absence of breech presentation. Similarly, we found no increased risk of DDH in our study sample, although 78.4% of deliveries were caesarean.[19]

In our study, we found a DDH prevalence of 2.9/1000 live births and determined that caesarean delivery, multiple pregnancy, and hip side did not increase the risk of DDH. Multiple pregnancy, birth

type, and being the first child did not correlate with DDH prevalence, and thus are not considered to be risk factors. If universal screening is not possible, we suggest selective ultrasound screening of babies with DDH risk factors; in particular, girls should be examined more carefully.

*The authors declare that there are no conflicts of interest.

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