Original Article

Breech Neonate

The Relationship between Developmental Dysplasia of Hip and Mode of Delivery in Term-breech-neonate

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ABSTRACT

Objective: To investigate the relationship between developmental dysplasia of the hip and mode of delivery in term breech neonates.

Study Design: Prospective Cohort Study

Place and Duration of Study: This study was conducted in Khyber Teaching Hospital Peshawar from May 2012 to April 2013.

Materials and Methods: Over the study period all neonates delivered at term as singleton breech in the Obstetrics & Gynecology department of Khyber Teaching Hospital were included in the study. Period of gestation, parity, and mode of delivery, fetal gender and birth weight of each neonate was recorded. All neonates were assessed for DDH both clinically and through ultrasound. Severity of dysplasia was graded using modified Graf's static morphological method. Correlation was made between DDH and mode of delivery. Mode of delivery was categorized as vaginal delivery, emergency cesarean section and elective cesarean section.

Results: There were a total of 283 breech deliveries during the study period, out of which 16 had DDH. Incidence was more in primigravidae. Majority were females. DDH was more common in vaginally delivered breech babies, in majority of whom DDH was more severe (Graf type III & IV, as opposed to babies delivered through elective cesarean section.

Conclusion: Vaginally delivered breech babies constitute a high risk group for DDH. Clinical examination followed by ultrasound examination of both hip joints should be undertaken in all babies delivered as breech so as to institute management in time to prevent avascular necrosis of femoral head.

Key Words: Dysplasia of Hip, Breach Neonates, Vaginal Delivery, Cesarean section.

INTRODUCTION

Developmental dysplasia of the hip (DDH), formerly known as congenital dislocation of the hip, comprises a spectrum of abnormalities that include abnormal acetabular shape (dysplasia) and malposition of the femoral head, ranging from dislocatable hip and mild subluxation to fixed dislocation.[1,2]It is difficult to assess the true incidence of DDH, as the definition varies and there is no gold-standard test. Incidence varies from 1.5 to 20 in 1,000 births.[3]

Diagnosis of DDH at birth includes clinical evaluation and imaging such as radiography and ultrasound examination.[4,5]Findings suggesting DDH include asymmetric skin folds in the proximal thigh and shortening of the thigh on the dislocated side. [2,4,6] Confirmatory findings include a positive Ortolani test or a positive Barlow test.[4,7] Radiographs are readily available and relatively low in cost. The main limitations are radiation exposure and radiography's inability to demonstrate the cartilaginous femoral head.[8,9] Radiographs are of limited value during an infant's first 3 months of life, when the femoral heads are composed entirely of cartilage, but they become more reliable for use in infants 4–6 months of age, with the appearance of femoral head ossification.[8,9]

Ultrasound evaluation of the hip is performed using a high-frequency linear array transducer. Two methods have emerged: a static acetabular morphology method proposed by Graf [10] and a dynamic stress technique proposed by Harcke.[11]Graf method is based on a single coronal image. Graf developed a morphologic and geometric hip classification scheme (types I-IV) using an alpha angle, which measures the osseous acetabular roof angle, and a beta angle, which defines the position of the echogenic fibrocartilaginous acetabular labrum.Harcke developed the dynamic or real-time method, using ultrasound to attempt visualize the Barlow and Ortolani maneuvers. This technique is performed in both the coronal and transverse planes, with and without stress.

Breech presentation is an important risk factor for developmental dysplasia of the hip (DDH).[12] Other risk factors being female gender, positive family history and oligohydramnios.[13,14,15] The obstetric management of term singleton breech deliveries has been greatly influenced by the results of the Term Breech Trial in 2000.[16]This study concluded that reduced perinatal morbidity is associated with term singleton breech births undertaken by elective Caesarean section. In 2001, the Royal College of Obstetrics and Gynaecology[17] published guidelines supporting this conclusion. This study was carried out to find out

whether this change in delivery policy has any effect on reducing the incidence of DDH in breech deliveries. The study examined whether the mode of delivery plays a role in DDH in term singleton infants presenting by the breech.

MATERIALS AND METHODS

All singleton term neonates delivered as breech (≥ 37 weeks gestation) between January 2012 and January 2013 over a one year period at the Obstetrics and Gynecology department of Khyber Teaching Hospital were included. For each neonate the maternal parity, birth weight, gender and breech type (extended or flexed) were recorded. For each breech birth, the mode of delivery was categorized as vaginal, emergency caesarean section in labour or elective pre-labour caesarean section. Each breech infant was examined by the author to identify those with DDH and correlate them with mode of delivery. Ortolani and Barlow tests were done to assess each neonate. To classify the neonates according to hip instability, we used the Tonnis system[18]: grade 1, slight capsular instability with no snapping sign; grade 2, subluxatable hip (Ortolani's snapping); grade 3, dislocatable and reducible hip (dislocation sign); grade 4, fully dislocated, irreducible hip. All neonates were subjected to ultrasound examination to grade the severity of DDH. To reduce inter-observer variation ultrasound was performed by a single expert ultrasonologist. Severity of dysplasia was graded using modified Graf's static morphological method.

RESULTS

During the 12 month period a total of 9,438 babies were born in the Khyber Teaching Hospital Peshawar, of whom 283 fulfilled our inclusion criteria. There were 210 deliveries by caesarean section and 73 vaginal births. Of the 283 neonates, 10 had clinical evidence of DDH however ultrasound examination detected 6 extra cases making a total of 16 cases of DDH. There were 4 bilateral dysplasias, 3 right hips only and 9 left hips only. The breech classification comprised 8 extended, 4 flexed and 4 unspecified. There were 11 females and 5 males. Among the mothers, 10 were primiparous and 6 multiparous. The mean birth weights for the infants with DDH according to delivery category were: 3.3 kg (2.43 to 4.0) vaginal, 3.4 kg (2.8 to 4.0) emergency caesarean, 3.7 kg (2.8 to 4.5) elective caesarean. The DDH incidence among vaginal breech births was 6 of 73 breech births (8.21%), compared with 7 of 120 (5.83%) for emergency caesarean sections and 3 of 90 (3.33%) for elective prelabour caesarean sections. The incidence of DDH was significantly different between breech infants delivered vaginally and those delivered by elective caesarean section (8.21% vs 3.33%; $p < 0.02$).

Table No.1: Characteristics of neonates with DDH

Gender	Female =11	Male=5
Maternal Parity	Primiparas = 10	Multiparas=6
Mode of delivery	Vaginal = 73 Emergency cesaraean =120 Elective cesarean= 90	
Birth weight (Mean)	Vaginal= 3.3kg Emergency cesarean=3.4kg Elective cesarean= 3.7kg	
Type of breech	Extended= 8 Flexed = 4 Unspecified = 4	
Laterality of DDH	Bilateral= 4 Left hip= 9 Right hip=3	

Table No.2: Relationship between the mode of delivery and the incidence of developmental dysplasia of the hip (DDH) in term breech infants

Mode of delivery	Number of neonates	Number of DDH (%)
Vaginal	73	6 (8.21%)
Emergency cesarean	120	7 (5.83%)
Elective cesarean	90	3 (3.33%)
Total	283	16 (5.65%)

Taking all grades of hip dysplasia into account (Graf types II, III and IV), there was no statistical difference in the incidence of dysplasia between the groups (elective section 8.2%, emergency section 7.9% and vaginal delivery 6.8%). However, when cases with Graf type II dysplasia, which may represent physiological immaturity, were excluded, the rate of type III and IV hips, which we consider to be clinically relevant, increased in the vaginally delivered group (4.8%) compared with the elective section group (1.2%), with a relative risk of approximately 1:4 (95% confidence interval 1.03 to 15.91). No difference was observed between the emergency and elective section groups, or between the emergency section and vaginally delivered groups.

DISCUSSION

Our findings indicate that the mode of delivery influences the incidence of DDH in infants in breech presentation. Those delivered vaginally had an incidence more than double that of breech infants delivered by pre-labour elective Caesarean. This correlates with the study done by Chan et al [13] who conducted a multicentre analysis of perinatal risk factors for hip dysplasia, and noted higher rates among infants delivered vaginally. Clausen et al [12] reported the same findings.

We suggest the force of labour on the fetal hip contributes to DDH. The resting intrauterine pressure is 4 to 5 mmHg but during the active phase of labour this

can increase to as much as 100 mmHg, which possibly contributes to the increased rates of hip dislocation in the vaginally-delivered group. Pressure may cause a hip, already susceptible to dislocation by virtue of ligamentous laxity to dislocate. This also explains the relatively increased risk of dysplasia in the emergency cesarean section group where there are increased compression forces on the neonate as compared to pre-labour elective cesarean section where the neonate is not exposed to the stress of labour. However, pressure alone does not explain the acetabular dysplasia associated with dislocation in some infants. In our study the incidence of DDH was more in primigravida with breech as opposed to multigravida mothers. This is similar to the observation of Wilkinson et al[15].This finding is again due to the fact that the fetus is subjected to less pressure effects in the multigravidae with lax uterus and relatively compliant birth canal.

We confirmed a higher rate of dislocation among girls, which is long recognized[13,15] and possibly related to increased joint laxity in response to maternal hormones such as relaxin. When considering the birth weights of breech infants with DDH, we found DDH to be more common in neonates with average birth weight as opposed to high birth weight. This is contrary to previous studies[13,15] which showed that the incidence of DDH was greater among larger babies. However it was so because the heavier infants were in the group with the lowest incidence of DDH (elective Caesarean section).

In our study we did ultrasound examination of hips in all neonates. Several studies [5,19,20,21] have compared clinical examination and ultrasound as methods of screening infants for DDH.Marks et al[19] reported that ultrasound screening for DDH can detect cases of instability not diagnosed at birth by routine clinical examination and in infants who have no risk factors for DDH.Tonnis et al [18] and Rosenberg et al [5]reported respectively that 52.2% and 50% of the ultrasonographically pathological hips in their studies had no clinical sign of instability. Omeroglu and Koparal[6] found that ultrasonography can detect acetabular dysplasia in patients whose clinical examination findings are normal. Our findings are similar to these where ultrasonography detected an extra 6 cases with no evidence of DDH on clinical examination. It is therefore recommended that high risk neonates like breech deliveries should be subjected to ultrasound examination.

Taking into account the Graf classification the incidence of Type III and IV hips which constitutes abnormal hips with frank subluxation was more in the vaginally delivered neonates. Incidence of Type II hips which do not require active management was not statistically different between the two groups. Same was observed by Clausen et al. [12]

We calculate that for every 1000 term singleton breech presentations there would be 81 cases of hip dislocation if all were delivered vaginally compared with 37 if all were delivered by elective caesarean section. This represents a 54% reduction in DDH. This not only represents a major financial benefit but also indicates the magnitude of the mechanical effects of labour on the hip joint in term breech cases.

CONCLUSION

Our study indicates that the mode of delivery has a significant influence on the incidence of DDH. It is more common in vaginally delivered breech neonates as compared to neonates born through planned pre-labour elective cesarean section. However the incidence is not decreased much when the cesarean section is done in emergency where the mother is already in labour. This implies that it is not only the actual phase of delivery but also the stress of uterine contractions which predispose the breech baby to DDH.

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