Predictive Factors and Short-term Fetal Outcomes of Breech Presentation: A Case-Control Study

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SUMMARY

Objective: This study evaluated the predictive factors and short-term fetal outcomes of breech presentation by comparing breech and cephalic pregnancies of ≥ 36 weeks' gestation.

Materials and Methods: Two hundred and one breech and 149 cephalic pregnancies of ≥ 36 weeks' gestation, with no other maternal or fetal problems, were compared with regard to placental localization, fetal heart rate variability, smoking, body mass index, maternal weight gain, placental weight, birth weight, sex, Apgar scores, and umbilical cord length.

Results: Maternal weight gain, body mass index at term, smoking and hemoglobin values were significantly higher in breech presentation than in cephalic pregnancies. The placenta was located in the cornu-fundal region in 63.2% of breech presentations and 26.8% of cephalic presentations ($p < 0.001$). Placental weights were 657 g and 597 g, respectively ($p < 0.001$). Umbilical cord length was shorter in breech than cephalic pregnancies ($p < 0.001$). Although breech pregnancies had significantly reduced fetal heart rate variability ($p < 0.001$), Apgar scores were much higher in breech fetuses than in cephalic fetuses. Ninety-five percent of breech pregnancies underwent cesarean sections.

Conclusion: Cornu-fundal localization of the placenta, smoking, greater maternal weight gain, higher body mass index at term, greater placental weight, shorter umbilical cord, and lower estimated fetal weight may be predictive of persistent breech presentation. Reduced fetal heart rate variability did not have an adverse effect on Apgar scores after cesarean delivery in breech fetuses with no other problems at term. [*Taiwan J Obstet Gynecol* 2008;47(4):402–407]

Key Words: Apgar score, breech presentation, placenta, placental localization, placental weight

Introduction

Breech presentation is defined as the initial entrance of the gluteal region, rather than the cephalic region, of the fetus into the maternal pelvis. The incidence of breech presentation is 25% before week 28, 7% at week 32 and 3–4% at 38–40 weeks of gestation [1]. The incidence of breech presentation is higher in low-birth-weight fetuses [2], when spontaneous conversion to cephalic presentation is prevented as term approaches, or if labor and delivery occur prematurely before cephalic version has taken place [3]. The predisposing factors for breech presentation are prematurity, multiple gestations, advanced multiparity, fetal hydrocephalus and anencephalus, other fetal anomalies, oligohydramnios, polyhydramnios, polar placentation, history of breech delivery, uterine anomalies, and pelvic tumors. Although the incidence of breech presentation is higher in cases of placenta previa, placenta previa is observed in only a very small percentage of breech presentations [4,5]. The umbilical cord is shorter in breech pregnancies than in cephalic ones [6]. Fetal mortality is three times higher in breech presentations than in cephalic ones, though this increased mortality may be based on increased chromosomal anomalies and/or fetal congenital malformations occurring in breech pregnancies, such as

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torticollis and congenital dislocation of the hip, which were not related to the delivery method [7,8].

Materials and Methods

Two hundred and one breech and 149 cephalic pregnancies of ≥ 36 weeks' gestation, with no other maternal or fetal problems, were compared with regard to placental localization, fetal heart rate (FHR) variability, smoking, body mass index (BMI), maternal weight gain, placental weight, birth weight, sex, Apgar scores, and umbilical cord length. All of the patients were informed about the study and provided signed consent. No patients had oligohydramnios, polyhydramnios, a history of breech delivery, advanced multiparity (> four deliveries), uterine anomalies or myomas, pelvic tumors, fetal anomalies detected by ultrasonography (USG), placenta previa, preeclampsia, eclampsia, pregnancy-induced hypertension, gestational diabetes mellitus, or other endocrinologic, infectious, hematologic, cardiovascular, respiratory or collagen tissue diseases during pregnancy. All patients were between 17 and 40 years old, had no systemic diseases, and had fetal reactive non-stress tests performed on admission. Age, parity, gestational age, increment of maternal weight during pregnancy, BMI at term, smoking history, and hemoglobin values were determined. Fetal biometry was performed and placental localization was determined after 36 weeks' gestation. Placental localization was classified by USG into five different categories: cornu-fundus, anterior uterine wall, posterior uterine wall, and left side and right side of the uterine wall. Non-stress tests were performed during the antepartum period. The type of delivery, sex of the fetus, and Apgar scores at 1 and 5 minutes were noted after delivery. The length of the umbilical cord (from the placental origin to the entrance point of the fetal abdomen) was measured. The proximal cord clamp was removed immediately after delivery, allowing blood drainage, and placental weight was determined after its surface was gently sponged with a piece of gauze.

Data were analyzed using the Statistical Package for the Social Sciences version 11.5 (SPSS Inc., Chicago, IL, USA) for Windows. Data analyses included Mann-Whitney and Chi-squared tests. A p value of < 0.05 was considered statistically significant.

Results

The women were classified as either breech ($n = 201$) or cephalic presentation ($n = 149$). There were no statistical differences between the breech and cephalic groups in terms of maternal age, gestational age or sex of the fetuses, though there was a slight predominance of female fetuses (female/male, 54.4%/45.6%) in the breech group. Maternal weight gain during pregnancy and BMI values calculated at term were significantly higher in the breech group than in the cephalic group ($p < 0.05$ and $p < 0.001$, respectively) (Table 1). There were no significant differences in mortality or morbidity between the breech and cephalic fetuses approaching term, in the absence of other maternal or fetal problems ($p > 0.05$).

There were significant differences between the breech and cephalic groups in placental weights and in placental

Table 1. Descriptive statistics for breech and cephalic pregnancies

	Breech presentation group ($n = 201$)	Cephalic presentation group ($n = 149$)	p
Age, yr	26.2	25.0	> 0.05
Gestational week	38.7	38.64	> 0.05
Sex of fetus			
Female	54.4%	52.7%	> 0.05
Male	45.6%	47.3%	
Maternal weight gain during pregnancy, kg (range)	12.79 (4–25)	11.73 (5–22)	< 0.05
Body mass index at term, kg/m^2 (range)	28.7 (19.5–42.5)	26.1 (21.0–35.0)	< 0.001
Hemoglobin value at term, g/dL (range)	12.34 (8.9–15.7)	11.45 (9.0–15.4)	< 0.001
Smoking ratio	15.4%	8.7%	< 0.001

Table 2. Comparison of placental localizations and placental weights between breech and cephalic presentation pregnancies

	Breech presentation group ($n = 201$)	Cephalic presentation group ($n = 149$)	Breech + cephalic presentation groups ($n = 350$)	p
Placental weight, g (range)	657 (320–1,280)	597 (330–995)	632 (320–1,280)	< 0.001
Placental localizations, n (%)				
Cornu-fundus	127 (63.2)	40 (26.8)	167 (47.7)	< 0.001
Anterior wall	37 (18.4)	34 (22.8)	71 (20.3)	
Posterior wall	22 (10.9)	35 (23.5)	57 (16.3)	
Right side of wall	12 (6.0)	25 (16.8)	37 (10.6)	
Left side of wall	3 (1.5)	15 (10.1)	18 (5.1)	

Table 3. Comparison of fetal heart rate variability for fetuses in breech and cephalic presentations

Variability, n (%)	Breech presentation group ($n = 201$)	Cephalic presentation group ($n = 149$)	p
Decreased	142 (70.6)	32 (21.5)	< 0.001
Normal	57 (28.4)	117 (78.5)	< 0.001
Increased	2 (1.0)*	0 (0)	–

**Two of the women who had increased variability are included in decreased variability group for statistical calculation.*

Table 4. Comparison of 1-minute and 5-minute Apgar scores of fetuses in breech and cephalic presentations

Apgar score	Breech presentation group ($n = 201$)	Cephalic presentation group ($n = 149$)	p
1 minute (range)	6.90 (2–7)	6.70 (5–7)	< 0.05
5 minutes (range)	8.96 (7–9)	8.80 (7–9)	< 0.001

localizations, determined by USG during the antenatal period and at term. Cornu-fundus localization of the placenta was 2.5 times more frequent in breech presentations compared with cephalic presentations. Placentas were heavier in the breech group than in the cephalic group ($p < 0.001$) (Table 2).

The average parity was 0.83 (range, 0–4) in the breech group and 1.00 (range, 0–4) in the cephalic group ($p < 0.001$). Of the 201 women in the breech group, 103 (51.2%) were nulliparous, 72 (35.8%) had undergone a previous cesarean, and 26 (12.9%) had undergone a previous vaginal delivery, compared with 54/149 (36.2%), 2/149 (1.3%) and 93/149 (62.4%), respectively, in the cephalic group. The overall percentages were 44.9%, 8.0% and 47.1%, respectively. From these data, we concluded that the breech group had a higher rate of previous cesarean deliveries and the cephalic group had a higher rate of previous vaginal deliveries ($p < 0.001$).

The average length of the umbilical cord was 48.05 cm (range, 30–100 cm) in breech presentations and 70.18 cm (range, 46–120 cm) in cephalic presentations ($p < 0.001$). The overall average length of the umbilical cord was 57 cm (range, 30–120 cm).

Non-stress tests were performed four to six times during the antepartum period, for at least 20 minutes in every 2 hours, and long- and short-term variability, reactivity and baseline heart rates were determined. Reactivity was defined as a FHR between 120 and 160 beats per minute (bpm) rising at least three times by > 15 beats and continuing for > 15 seconds, over a 20-minute period. Long-term variability was used to describe the oscillatory changes occurring during the course of 1 minute. A value of ≤ 5 bpm was considered to be a decrease, 6–25 bpm was considered to be normal, and > 25 bpm was considered to represent increased variability. Of the 201 fetuses in the breech group, 142 (70.6%) had decreased, 57 (28.4%) had normal and two (1.0%) had increased FHR variability. Of the 149 fetuses in the cephalic group, 32 (21.5%) had decreased, 117 (78.5%) had normal and none had increased variability. Breech fetuses, therefore, showed significantly more decreased variability, compared with cephalic ones ($p < 0.001$) (Table 3). Considering the breech fetuses alone, although the average umbilical cord length was 48.05 cm (range, 30–100 cm), 142 with decreased variability had shorter umbilical cord lengths (mean, 45 cm; range, 30–70 cm). In addition, the Apgar scores at 1 and 5 minutes were significantly higher in breech fetuses than in cephalic fetuses ($p < 0.05$ and $p < 0.001$, respectively) (Table 4).

Fetal biometry was performed at term. There were no significant differences between breech and cephalic fetuses in terms of mean biparietal diameter and mean femur length, which were 95 mm and 72 mm, respectively, in the breech group, and 94 mm and 73.5 mm, respectively, in the cephalic group ($p > 0.05$). However, the mean abdominal circumference was shorter in breech fetuses (326.9 mm; range, 300–394 mm) than in cephalic ones (346.8 mm; range, 304–368) ($p < 0.001$). Based on these parameters, the mean estimated fetal weights (EFWs) were 3,183 ± 138 g and 3,403 ± 239 g, respectively ($p < 0.001$). After delivery, the fetuses were weighed and the average weights were 3,227 g (range, 2,000–4,820 g) in the breech group and 3,393 g (range, 2,200–4,650 g) in the cephalic group ($p < 0.001$). The EFWs calculated by USG were in concordance with the real fetal weights.

Ninety-five percent (191/201) of the breech pregnancies were delivered by cesarean, and 5% (10/201) underwent vaginal delivery. All of the cephalic pregnancies were delivered vaginally. Indications for cesarean delivery in the breech group were: previous cesareans, primigravid breech presentation, and footling breech presentation in multiparous women. Of the 201 women with breech presentations, 62.2% were frank, 14.8% were complete and 23.0% were footling breech.

Discussion

There are several maternal and fetal factors that predispose to a breech presentation. In addition to uterine anomalies or myomas, pelvic tumors, advanced multiparity, fetal anomalies, changes of amniotic fluid, placental localization, and length of the umbilical cord should all be considered [1,6]. Some studies have found relationships between placenta previa and polar fundal localization of the placenta and an increased incidence of breech presentation [4,9,10]. Filipov et al [4] investigated 249 women at term, 124 of whom had breech presentations without uterine or fetal anomalies, and found that a cornu-fundus localization of the placenta occurred in 62.6% of breech and only in 4.8% of cephalic presentations. In addition, 3.2% of breech presentations were associated with either placenta previa or low-lying placenta, while none of the women with cephalic presentations had placenta previa [4]. In accordance with these results, another study found that cornu-fundus localization of the placenta occurred in approximately 70% of breech presentations, but only in about 5% of cephalic presentations [9,10]. In the present study, cases with placenta previa were excluded, but the incidence of placental cornu-fundus localizations in breech presentations was in agreement with the literature, though that of cornu-fundus localization in cephalic presentations was higher.

Adinma's study, in which 1,000 cases were observed, found the average umbilical cord length to be 51 cm (range, 15–130 cm), and also found that breech fetuses had shorter umbilical cords than those of cephalic fetuses [11]. Soernes and Bakke [12] also found the length of the umbilical cord to be shorter in breeches than in cephalic pregnancies, and suggested that the shortness of the umbilical cord affected fetal motor activity [13]. We also found the mean umbilical cord length to be shorter in breech presentations. In addition, breech fetuses with decreased FHR variability had shorter umbilical cords than breech fetuses without decreased FHR variability. No sedatives were used throughout the hospitalization period, and these FHR patterns, therefore, appeared to be related to the shorter umbilical cord lengths.

Maternal weight gain during pregnancy and BMI calculated at term were found to be significantly higher in breech presentations than in cephalic ones. This suggests that a greater increase in maternal weight and a higher BMI might be related to persistent breech presentation. Excluding breech presentations, one study found that obese women had approximately twice as many cesareans as non-obese women [14].

Several studies have demonstrated a correlation between fetal weight and EFW [15,16]. Based on these publications, we calculated EFWs using biparietal diameter, abdominal circumference and femur length, and correlated these with real fetal weights. However, as abdominal circumference measurements were smaller in breeches than in cephalic fetuses, EFWs and real fetal weights were higher in cephalic pregnancies than in breeches. These data correlate with the study by Luterkort et al [17], which demonstrated that the weights of 228 breech fetuses were 4.9% lower than those of cephalic fetuses.

In our study, the mean placental weight in the breech group was significantly higher than that in the cephalic group. Based on studies that pointed out a correlation between placental and fetal weight, we expected fetal weights of breech fetuses to be higher. However, breeches had lower fetal weights than those of cephalic fetuses, possibly because of the lower values of abdominal circumference [18–20]. Furthermore, in this study, although female fetuses were more common in the breech group, the results were not statistically significant. This was in agreement with another study that demonstrated a slight dominance of female fetuses for breech presentations [21].

Rayl et al [22] highlighted smoking as a risk factor for breech presentation. In the current study, we also found

that smoking was approximately twice as common during breech pregnancies as during cephalic pregnancies.

Phelan et al [23] evaluated the FHR in 141 breech pregnancies at term, before and after external cephalic version, and found that decreased variability of FHR was higher after version. In contrast to these data, breech fetuses in our study had a significantly decreased FHR variability. However, Apgar scores at 1 and 5 minutes were higher in breech fetuses than in cephalic fetuses (the very high rate of cesareans should be taken into account for the breech fetuses). Apgar scores at 1 and 5 minutes were lower in breech presentation fetuses that were delivered vaginally, compared with the values for vertex fetuses in the literature. Considering the breech fetuses alone, the Apgar scores of fetuses delivered by cesarean were higher than those delivered vaginally [24,25]. This study, therefore, demonstrated that the 1-minute and 5-minute Apgar scores of breeches were higher than those of cephalic cases, even though they had a decreased FHR variability. In other words, decreased FHR variability did not appear to adversely affect Apgar scores following cesarean delivery of breech fetuses, with no other problems at term. Fetal mortality and morbidity are known to be higher in breech than cephalic presentations, but our study found similar rates for both groups when the fetuses came up to term, and there were no other associated maternal or fetal problems [1,6,7].

Although cases with advanced multiparity were excluded from this study, there was a statistically significant difference in parity between breech and cephalic pregnancies; parity of the breech group was significantly lower than that of the cephalic group. Fox et al [26] mentioned a 66% risk of abnormal presentation at term for a first pregnancy, and a 43% risk for multipara by 33 weeks. In addition, the breech group in our study had a higher rate of previous cesarean deliveries than the cephalic group. Vendittelli et al [27] also reported that women with previous cesarean deliveries were at twice the risk of breech presentation at term than women with previous vaginal deliveries, which was in agreement with our data.

In summary, we conclude that cornu-fundus localization of placenta, smoking, greater maternal weight gain, higher BMI at term, greater placental weight, shorter umbilical cord, and lower EFW may be causative factors for persistent breech presentation. A heavier placenta would occupy more space in the uterus, so preventing spontaneous version to a cephalic presentation. Similarly, fetal motor activity would be limited by the shorter umbilical cord in breech fetuses, also preventing spontaneous cephalic version. Regarding the EFW, the risk of persistent breech presentation is higher when the EFW is smaller than expected. Determination of these parameters during the early weeks of gestation in breech presentation pregnancies may help to evaluate the risk of persistence of the breech presentation and the possibility of spontaneous cephalic version.

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