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Common determinants of breech presentation at birth in singletons: a population-based study

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ABSTRACT

Objective: To estimate common determinants of breech presentation at parturition.
Study design: A population-based cohort study (between 1/1/2001 and 31/12/2010) was conducted among all women who delivered a singleton baby in breech presentation from 22 completed weeks of gestation. A binary logistic regression was used to determine independent feto–maternal characteristics of breech presentation at birth, adjusted odds ratios and 95% confidence intervals. Variables were: gestational age, birth weight, maternal age, parity and gender of the baby, presence or absence of a history of cesarean section, gestational diabetes, gestational hypertension, pregnancy after assisted reproduction technology and congenital malformations.
Results: From a population of 611,021 women; 28,059 were delivered in breech presentation (4.59%). Independent determinants of breech presentation at delivery were: gestational age and birth weight (the lower, the higher the incidence of breech at birth), parity (the frequency of breech decreased with increasing parity) and maternal age (the older the mother, the higher the odds for breech presentation). Women who had a scarred uterus, due to a previous cesarean section, women who gave birth to a female offspring and women whose baby showed a congenital malformation, were more prone to be delivered in breech presentation.
Conclusion: Low gestational age and birth weight, advanced maternal age, a scarred uterus, a female baby and a baby with a congenital malformation increased the odds for singleton breech presentation at parturition. The latter gradually decreased with increasing parity.

Introduction

The overall incidence of breech presentation at birth is between 4 and 5%. The lower the gestational age, the more frequent the baby lies in the breech position. At 28 weeks, for instance, 22% present by breech, at term it is less than 4% [1]. The most common cause of breech presentation is therefore preterm delivery. Nearer term, a breech presentation must be the result of something preventing a spontaneous version to the vertex position. This may be due to mechanical factors such as uterine abnormalities or a contracted pelvis. Fetal growth retardation, oligo- or polyhydramnios and fetal malformations such as hydrocephalus are also recognized causes of breech presentation. However, all these factors are found in only a small amount of breech presentations and usually no single cause of the breech presentation can be identified [2]. This study aimed at making an inventory of common obstetrical characteristics that are independently associated with breech presentation at parturition. To that end we conducted a population-based cohort study.

Materials and methods

Flanders, the Dutch speaking northern part of the constitutionally federal state of Belgium, has 6.2 million inhabitants and on average 62,000 births per year of which 99% take place in the hospital maternity units. All of the following data were derived from the computer files of the Study Centre for Perinatal Epidemiology (SPE). The SPE is an independent, regionally funded, centre that registers all births of >500 g and/or 22 weeks gestation. For each newborn, a standard perinatal form is completed (mostly by the midwife) and sent to the SPE where all data are checked by an error detection program and feedback is given. During the study period 1/1/2001–31/12/2010, 613,356 singleton births were registered of which 4.6% were born in breech presentation. We

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excluded 2335 records due to missing values for the response or explanatory variables, leaving 611,021 records in the final model.

Approval by the ethics committee was not obtained since the study extracted anonymous data from an existing dataset of the SPE for which appropriate permissions have already been obtained (www.zorg-en-gezondheid.be/). It is not possible to identify individuals from the information provided.

Categorical variables were compared with chi-square tests (SAS software, version 9.3). The level of statistical significance was set at a probability value of <0.01. A multiple binary logistic regression analysis was done to assess interrelations between risk factors. Results were expressed as adjusted odds ratios (OR) and corresponding 95% confidence intervals (CIs).

Results

Of the 611,021 singleton infants, born from 22 weeks on, 28,059 were delivered in breech presentation (4.59%). Table 1 shows the distribution of the frequency of birth in breech presentation according to the gestational age. There is a gradual decline in breech delivery that is consistent with the increase in gestational age. However, compared to weeks 35–37, we found a small increase in breech presentation at week 38. Beyond 39 weeks gestation, breech presentation at delivery dropped to 0.9% (Table 1).

In order to elucidate independent characteristics of breech presentation at birth, we performed a multiple binary logistic regression with presentation (breech/no breech) as outcome variable and the variables gestational age category, birth weight category, maternal age category, parity, history of cesarean section, gestational diabetes or hypertension, pregnancy after assisted reproduction technology (in vitro fertilisation/intracytoplasmatic sperm injection), gender (male/female), and congenital malformations (yes/no), as predictors.

The predictors which significantly correlated with breech presentation at birth are shown in Table 2 and the Fig. 1. Gestational age and birth weight were the most important determinants of breech presentation at parturition. The odds for having a birth in breech presentation rose with the increasing age of the mother. But with parity, the odds for breech decreased. A history of cesarean section independently increased the odds for breech by 44%. Giving birth to a baby with a congenital malformation in the current pregnancy increased the odds by 24%. Table 2 also shows that the odds for breech were 1.28 times higher in female compared to male babies after being controlled for relevant characteristics such as gestational and maternal age, parity, history of cesarean section (yes/no) and congenital malformations (yes/no).

Table 1
The SAS system.

Gestational age (weeks)	Proportion breech	LowerCL	UpperCL	Number breech	Total
22–24	35.3%	29.5%	41.6%	84	238
25–26	33.6%	29.9%	37.4%	201	599
27–28	25.2%	22.6%	28.1%	234	927
29	22.3%	18.9%	26.1%	112	503
30	20.4%	17.7%	23.3%	158	776
31	19.4%	17.0%	22.0%	188	971
32	14.1%	12.5%	16.0%	215	1523
33	13.0%	11.7%	14.4%	302	2331
34	11.6%	10.6%	12.5%	511	4423
35	9.4%	8.8%	10.1%	723	7652
36	8.0%	7.7%	8.5%	1378	17125
37	8.1%	7.9%	8.4%	3435	42370
38	9.5%	9.4%	9.7%	10482	110028
39	4.7%	4.6%	4.8%	7867	168157
>39	0.9%	0.8%	0.9%	2169	253398

Breech presentation at birth was not significantly more common in women who had gestational diabetes or hypertension. Breech presentation at parturition was more frequently seen after assisted reproduction technology (5.91%) than after spontaneously conceived pregnancies (4.44%, chi-square $p < 0.01$) However after adjustment for all the aforementioned relevant confounding factors, the significant difference abated.

Comments

This large cohort study aimed at elucidating common independent determinants of breech presentation at birth. Our results are in line with previous, less extensive, population-based cohort studies [1,3–8]. Factors associated with increased risk of breech delivery in Flanders (northern Belgium) are: low gestational age and low birth weight, increasing maternal age, primiparity, history of cesarean section, female gender and presence of a congenital malformation.

The earlier the gestational age, the higher the prevalence of breech presentation will be. We found a small increase of breech presentation at week 38 compared to weeks 35–37 (Fig. 1). This increase was iatrogenic. It was the result of the policy of performing elective pre-labor cesarean sections for breech from 38 weeks on. By doing so, we created an artificial peak in the number of births in breech presentation in that specific week and we certainly prevented some fetuses the opportunity as yet to turn spontaneously. Subsequently, beyond 39 weeks, there were almost no women with a baby in breech position left to give birth. Therefore the decrease in breech delivery beyond 39 weeks was also iatrogenic.

Gestational age and birth weight are interrelated. However, at birth, breech neonates weighed less than vertex neonates after being controlled for relevant factors. This is found on several occasions [2,7,8]. The relationship between intrauterine growth retardation and breech presentation in both preterm and term infants has been clearly demonstrated [2,7–9].

Multiparity and a female gender are associated with breech presentation at birth. It has been suggested that this is a fetal size effect [7]. Indeed, infants born to primiparous women are lighter than those born to multiparous women, and girls, on average, are smaller than boys [10]. However, in this study, parity and gender were independent determinants. Factors, other than birth weight must play a role. A report from Norway [11] suggests that women who delivered a baby in breech presentation, mostly after cesarean section, less frequently decide to have another pregnancy. This may explain the higher frequency of primiparity in breech presentation [11]. Witkop [12] et al. performed prenatal ultrasound in 7045 women and found that a non-vertex fetus at 35 weeks in nulliparous women had twice the risk of staying in that position at delivery compared to multiparous women. This is probably due to the more relaxed muscle tone of the uterine and abdominal wall in multiparous women [6]. And it may also be the reason why the success rate of external cephalic version is significantly higher in multiparous women. [13].

Half a century ago, Morgan and Kane [2] reported a higher incidence of breech presentation in female compared to male offspring. Other studies have supported this finding [5,7,8,14–16] but no clear aetiology has been put forward to elucidate this association. Soernes and Bakke showed that, due to differences in intrauterine fetal motor activity, the umbilical cord is shorter in babies born in breech than in vertex presentations [15]. They also reported that the mean cord length is somewhat shorter in female compared to male infants, suggesting a higher fetal activity in boys. Consequently, female babies are more prone to be born in breech presentation [15].