

OBSTETRICS

Is a breech presentation at term more frequent in women with a history of cesarean delivery?

Françoise Vendittelli, MD, PhD; Olivier Rivière; Catherine Crenn-Hébert, MD; Marc-Alain Rozan, MD; Bernard Maria, MD; Bernard Jacquetin, MD; and the obstetricians of the AUDIPOG Sentinel Network

OBJECTIVE: The purpose of this study was to determine whether breech presentation at term is more common among women with at least 1 previous cesarean delivery.

STUDY DESIGN: This historic cohort study ($n = 84,688$) included women with a singleton term pregnancy and at least 1 previous delivery. Results were expressed as crude relative risks and adjusted odds ratios.

RESULTS: While 2.46% of women had a fetus in breech presentation at term, 14.91% of women had had 1 or more previous cesareans. The relative risk of a breech presentation at term for women with a history

of cesarean was 2.18 (95%CI: 1.98-2.39). It did not differ according to the number of previous cesareans. The logistic regression analysis took into account confounding factors including gestational age, maternal age, parity, birthweight, and oligohydramnios. The adjusted odds ratio was 2.12 (95%CI: 1.91-2.36).

CONCLUSION: Women with previous cesarean deliveries have a risk of breech presentation at term twice that of women with previous vaginal deliveries.

Key words: breech presentation, cesarean delivery, uterine scar

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The number of cesarean deliveries continues to increase in Western countries, although the rate varies from country to country. The global percentage of cesareans reported in France was 16.3% in 1999, 17.6% in 2001, 18.7% in 2003, and 19.2% in 2005 (<http://>

<http://> audipog.net). The percentage of prophylactic cesareans after a previous cesarean was 34.2% in 1999, 36% in 2001, 37.7% in 2003, and 42.7% in 2005 (<http://> audipog.net). The principal indications for cesareans include previous cesarean delivery, dystocia, fetal distress, and breech presentation.¹⁻³

The findings of the international randomized trial on breech presentations, supported by the result of a metaanalysis, probably account in part for the increase observed in 2003 in the number of cesareans for breech presentations at term.^{4,5} In France, the percentage of prophylactic cesareans in this situation thus increased from 45.6% in 1999 to 49.9% in 2001 and then to 61.1% in 2002. It subsequently fell back to 51.4% in 2003 and climbed slightly to 52.3% in 2005.⁶

We examined the association of users of computerized pediatric, obstetric and gynecologic records (AUDIPOG) perinatal databank to analyze neonatal morbidity and mortality in cases of breech presentation at term⁷ before the publication by Hannah et al.⁴ During that study we observed that there appeared to be more fetuses in breech presentation at term among mothers who had previously had a cesarean delivery than

among mothers without this history. We therefore sought here to determine whether breech presentations at term were really more frequent in women with previous cesareans.

MATERIALS AND METHODS

Materials

This study concerned all the deliveries included in the AUDIPOG sentinel network databank. This network, created in 1994, comprises public and private maternity units from every region in France that contribute individual data on mothers and infants for pooling and analysis. Its objective is to provide epidemiologic surveillance of perinatal health indicators and medical practices. The AUDIPOG databank contains medical data collected by the participating maternity units on pregnancies, deliveries, and the postpartum period. Each volunteering hospital participates for a given period each year, chosen by them—usually 1 month but sometimes the entire year. They forward all data about all women who give birth during this period at a term of > 22 weeks (or a birthweight > 500 g) and about the infants. These data, collected continuously for at least

From the Association des Utilisateurs de Dossiers Informatisés en Pédiatrie, Obstétrique et Gynécologie (AUDIPOG) sentinel network (all authors) and Faculté de Médecine RTH Laennec (Mr Rivière), Lyon; Clermont-Ferrand Maternity University Hospital (Drs Vendittelli and Jacquetin) and Auvergne Medical University (Dr Jacquetin), Clermont-Ferrand; and the Department of Gynecology and Obstetrics, AP-HP, Hôpital Louis Mourier, Colombes (Dr Crenn-Hébert), France.

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Reprints: Dr Vendittelli Françoise, CHU de Clermont-Ferrand, Fédération de Gynécologie-Obstétrique, Maternité de l'Hôtel-Dieu, Boulevard Léon Malfreyt, 63058 Clermont-Ferrand cedex 1. fvendittelli@chu-clermontferrand.fr.

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1 month by healthcare professionals, have been validated nationally by national perinatal professional associations.⁸ They usually help to facilitate good coordination between the professionals caring for mothers and newborns. On request, AUDIPOG furnishes institutions with structured data forms on paper and provides specifications for computerized perinatal files to specialized software publishers. Maternity units or perinatal health networks in the process of evaluation can also enter data directly at our website. The validity of the data in this database is demonstrated by the fact that it furnishes national perinatal indicators that are consistent with national surveys commissioned by the Ministry of Health.⁶ Moreover, this database is used regularly to help develop practice guidelines and for numerous publications.⁹⁻¹³ All of our publications are available at our website (<http://audipog.net>). At the time of this study, the databank included 249,709 pregnancies from 1994 through 2005 from 209 participating maternity units.

Inclusion and exclusion criteria

Within this population, we excluded all nulliparous women, including instead all women who had already had at least 1 child and who presented to a participating institution with a singleton pregnancy at term (> 37 weeks) ($n = 121,478$) in labor or for a planned cesarean, with a fetus in either cephalic or breech presentation ($n = 117,153$). The study excluded pregnancies with elective abortions or in utero fetal deaths and fetuses with congenital malformations, mainly cerebral (leaving 116,419 cases). In interpreting these data, it is useful to know that in France pregnancies may be terminated for medical reasons at any point and that pregnant women receive as routine care 3 ultrasound examinations, completely covered by the national health insurance funds. Women with a history of uterine surgery (other than cesarean delivery) or a tumor previa (fibroma or ovarian cyst) or a congenital uterine malformation were also excluded from the analysis. For the latter

variable we excluded all files indicating a history of gynecologic disease that might interfere with pregnancy or require special monitoring during pregnancy. This variable is clearly worded and is assessed at the beginning of pregnancy in the "history" section of the files developed by AUDIPOG (leaving 103,695 cases).

Women for whom essential data, such as previous pregnancies, were missing from the database were also excluded. After these diverse exclusions, the study sample included 84,688 women.

METHODS

Associations between breech presentation at term and a uterine scar were expressed as crude relative risks (RR) with their 95% confidence intervals (95% CI).

Potential confounding factors mentioned in the literature as possibly affecting the relation between exposure (uterine scar) and disease (breech presentation), such as risk factors for a breech presentation at term, were sought.^{7,14-16} Accordingly, we sought to identify the risk factors for breech presentation at term from the following: maternal age (≤ 35 vs > 35 years), number of previous deliveries (1 vs ≥ 2), abnormal quantity of amniotic fluid (polyhydramnios or oligohydramnios), gestational age at delivery (37-39 vs > 39 weeks), existence of placenta previa, and birthweight (< 3000 vs ≥ 3000 g). Finally, we studied the relation of these risk factors to the existence of a uterine scar.

Categoric variables were compared by chi-square tests (or Fisher exact test, as appropriate) and continuous variables were compared by Student *t* test. The existence of heterogeneity, on the one hand, between a uterine scar and the number of previous deliveries, and on the other hand, between a uterine scar and external cephalic version (ECV), was studied by the Breslow-Day test for RR homogeneity, after calculating the Cochran-Mantel-Haenszel adjusted RR. A backward stepwise logistic regression analysis was performed to study the relation between breech presentation at term and a uterine scar from a previous cesarean, while taking into account the

previously identified confounding and prognostic factors (with $P \leq .10$) to calculate an adjusted odds ratio (OR) and its 95% CI.

The cutoff value for *P* was .05. All statistical analyses were performed with SAS software (version 8, SAS Institute, Inc, Cary, NC, 1999).

RESULTS

In our cohort the mean maternal age was 30.91 (± 4.92) years ($n = 84,459$) and the mean number of previous deliveries (all subjects were at least para 1) was 1.68 (± 1.11) ($n = 84,688$). The mean gestational age at delivery was 39.37 (± 1.19) ($n = 84,688$). Of the women in the sample, 73.26% came from France, 81.47% did not smoke during this pregnancy, and 66.71% had a body mass index at the beginning of pregnancy (BMI) between 20 and 30 (Table 1). Table 1 also describes social and demographic characteristics among the unexposed and exposed subgroups.

Of the 84,688 women in our sample, 2084 had a fetus in breech presentation at term (2.46%) and 12,629 women (14.91%) had had 1 or more previous cesareans.

The crude RR of a fetus in breech presentation at term in women with a history of cesarean was 2.18 (1.98-2.39) (Table 2). It did not differ according to the number of previous cesareans (1 vs > 2 cesareans).

The risk factors for breech presentation at term considered in our analysis were: maternal age, number of previous deliveries, oligohydramnios, gestational age at delivery, and birthweight ($P < .02$) (Table 3). The factors associated with a uterine scar from a previous cesarean are described in Table 4. The confounding factors found in our study—that is, associated with both exposure (uterine scar) and disease (breech presentation) in those who were not exposed and which are not immediate factors between exposure and disease—were: maternal age, parity, oligohydramnios, gestational age at delivery, birthweight, and family status (1.78% of breech presentations among women who lived alone vs 2.20% among women living with a the baby's

TABLE 1

Description of the social and demographic characteristics of the overall cohort and in the exposed and unexposed subgroups

	Overall cohort (n = 84,688) %	Women without uterine scar (n = 72,059) %	Women with a uterine scar (n = 12,629) %	P value
Family status (n = 69,887)				
Lives alone	8.72	8.81	8.22	.0441
Lives with partner	91.28	91.19	91.78	
Geographic origin (n = 62,583)				
France	73.26	73.93	69.74	<.0001
Southern Europe	3.03	2.95	3.47	
North Africa	8.66	8.38	10.14	
Other	15.05	14.75	16.65	
Smoked during this pregnancy (n = 75,313)				
No	81.47	81.60	80.68	.0225
Yes	18.53	18.40	19.32	
Body mass index (n = 75,037)				
< 20	24.41	25.44	18.49	<.0001
20-30	66.71	66.62	67.18	
> 30	8.89	7.93	14.32	

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father; $P = .04$). The other variables described in Table 1 were also considered to be risk factors for breech presentations in our study (geographic origin, smoking during pregnancy, BMI).

We had information about whether or not ECV was performed for 52,983 women in our sample (that is, 62.56%). In all, 633 women had ECV, including 398 women who finally had a fetus in cephalic presentation at term (that is, a

success rate of 62.88%). ECV was proposed to only 38.27% of the women with fetuses in breech position. Of the 6789 women in the study with a uterine scar, 338 had a fetus in breech presentation and could theoretically have had ECV. It was attempted, however, for only 55 of them, for an ECV rate of 16.27% and a success rate of 49.09%. We found no relation between the number of previous deliveries and uterine scars from previ-

ous cesarean ($P = .40$), nor between ECV and uterine scars ($P = .21$).

The logistic regression analysis took into account the confounding and prognostic factors identified above. Our final multivariate analysis included the following variables: maternal age (≤ 35 vs > 35 years), oligohydramnios, gestational age at delivery (37-39 vs > 39 weeks), parity, and birthweight (< 3000 vs ≥ 3000 g) (n = 77,373). We found no

TABLE 2

Crude RR and adjusted OR of a fetus in breech presentation at term and a cesarean scar among women who have already had at least 1 child

Number of previous cesareans	Cephalic presentation (n = 65,065) %	Breech presentation (n = 1723) %	RR (95%CI)	Adjusted OR ^a (95%CI)
None vs at least 1 cesarean				
0	97.91	2.09	1	1
1 or more (> 1)	95.44	4.56	2.18 (1.98-2.39)	2.12 (1.91-2.36)
None vs 1 or more previous cesareans				
0	97.91	2.09	1	1
1	95.42	4.58	2.19 (1.98-2.42)	2.18 (1.95-2.48)
≥ 2	95.53	4.47	2.14 (1.76-2.60)	1.91 (1.52-2.38)

^a Adjusted for maternal age (≤ 35 years vs > 35 years), oligohydramnios, gestational age at delivery (37-39 weeks vs > 39 weeks), parity, and birthweight (< 3000 g vs ≥ 3000 g).

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TABLE 3
Identification of risk factors for breech presentation at term

Potential risk factors	Cephalic presentation % [mean ± SD] (n = 82,604)	Breech presentation % [mean ± SD] (n = 2084)	P value
Maternal age (n = 84,459)	[30.90 ± 4.93]	[31.50 ± 4.75]	<.001
≤ 35 years	97.61	2.39	.0092
> 35 years	97.25	2.75	
Previous deliveries (n = 84,688)	[1.68 ± 1.10]	[1.65 ± 1.15]	.3162
1	97.42	2.58	.0058
> 1	97.72	2.28	
Placenta previa (n = 80,165)			
No	97.52	2.48	.5905
Yes	98.59	1.41	
Polyhydramnios (n = 77,704)			
No	97.55	2.45	.3704
Yes	96.96	3.04	
Oligohydramnios (n = 77,704)			
No	97.58	2.42	<.0001
Yes	90.03	9.97	
Gestational age at delivery (n = 84,688)	[39.39 ± 1.18]	[38.87 ± 1.17]	<.0001
37-39 weeks	96.62	3.38	<.0001
> 39 weeks	98.56	1.44	
Birthweight (n = 84,536)			
< 3000 g	95.91	4.09	<.0001
≥ 3000 g	97.92	2.08	

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interaction between maternal age and parity in our logistic regression analysis. The adjusted OR was 2.12 (95% CI 1.91-2.36) (Table 2). The adjusted risk did not increase when we took into account the number of previous cesareans. When we limited our multivariate analysis to women whose files specified that no ECV was attempted, the adjusted OR was 2.52 (95% CI 2.18-2.91).

COMMENT

This study appeared important to us in view of both the apparent absence of any other publications on this topic and the increase in the total number of cesareans in the West, for—among other indications—breech presentation at term.^{2,17-19} According to Joseph et al the rate of primary cesareans for breech presentation increased by 25% in Nova Scotia, Canada, between 1988 and 2000, after exclusion of women

with previous cesareans.¹⁷ In another publication, the authors stressed that most of the recent increase in cesarean delivery rates in Canada is attributable to increases in primary cesarean deliveries for dystocia and in elective repeat cesareans.¹⁹ Moreover, the proportion of vaginal deliveries after previous cesareans has decreased.^{20,21} The current data thus indicate that the rate of repeat cesareans must progress since a previous cesarean slightly increases the risk of breech presentation at term.

We note that after taking the confounding and prognostic factors into account the risk of a breech presentation at term for women with previous cesareans was twice that of women with previous vaginal deliveries: adjusted OR 2.12 (95% CI 1.91-2.36).

One of the weaknesses of our study is that the variable about ECV is often missing in our databank, especially when it was

not performed. ECV cannot in any case be considered a confounding factor, because it is never performed for fetuses in cephalic presentation. Uterine scars are not a contraindication to ECV in France. In our study the ECV rate in cases of uterine scars was approximately 16%. Overall, ECV was relatively uncommon (38%) in our study, although it is recommended. Its overall success rate appears not to exceed roughly 50% to 60%, varying according to team,^{22,23} although it reached 62.88% in our study. The rate of fetuses spontaneously returning to breech presentation after successful ECV was very low. Moreover, we did not find any relationship between the number of previous deliveries and uterine scars from a previous cesarean ($P = .40$), nor between ECV and uterine scars ($P = .21$). When we limited our logistic regression analysis to women known not to have had ECV, we found a risk of breech presentation at term twice as high

TABLE 4

Relation between the risk factors for a fetus in breech presentation at term identified above and a uterine scar from a previous cesarean

Potential confounding factors	Absence of uterine scar % [mean \pm SD] (n = 72,059)	Previous cesarean % [mean \pm SD] (n = 12,629)	P value
Maternal age (n = 84,459)	[30.83 \pm 4.92]	[31.39 \pm 4.89]	<.0001
\leq 35 years	85.52	14.48	<.0001
> 35 years	83.11	16.89	
Previous deliveries (n = 84,688)	[1.68 \pm 1.11]	[1.67 \pm 1.08]	.6631
1	85.33	14.67	.0162
> 1	84.73	15.27	
Oligohydramnios (n = 77,704)			
No	85.59	14.41	.0368
Yes	81.72	18.28	
Gestational age at delivery (n = 84,688)	[39.42 \pm 1.17]	[39.13 \pm 1.23]	<.0001
37-39 weeks	82.24	17.76	<.0001
> 39 weeks	88.24	11.76	
Birthweight (84,536)			
< 3000 g	82.74	17.26	<.0001
\geq 3000 g	85.64	14.36	

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in the women with at least 1 previous cesarean. Accordingly, the increase we observed in the risk of breech presentation in the case of 1 or more previous cesareans cannot be explained solely by the practice of ECV, which differs between the subgroups of women with and without previous cesareans and with breech presentations. Another limitation of our study is that we do not know the fetal presentation from previous pregnancies. Women with a fetus in breech are more likely to have another breech presentation in a subsequent pregnancy. Nonetheless, this association is found especially in women with a congenital uterine malformation (which is rare in women at term) and in women with a fetus with a congenital malformation, neurological in particular. For this reason we excluded from our analysis the women known at the beginning of this pregnancy to have a gynecologic history that might interfere with the pregnancy. For the same reason, we excluded the in utero fetal deaths and the congenital malformations, including those that led to a medically indicated termination of pregnancy. Given that our analysis excluded many of the women at risk of recurrence of a fetus in

breech presentation, our results are unlikely to be biased to any substantial extent.

Thus, to the list of long-term risk factors for cesarean already known—placenta accreta or percreta, later subfertility, ectopic pregnancies, and uterine rupture during labor—we must add an increase in breech presentations.²⁴⁻²⁷

In conclusion, a woman appears to be twice as likely to have a fetus in breech presentation at term if she has previously had a cesarean delivery than if she previously had a vaginal delivery. The increase in the number of cesareans observed in North American and European countries is part of what appears to be a vicious cycle. We hope that other teams with perinatal databanks will attempt to confirm our results. ■

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