

# Previous cesarean section increases the risk for breech presentation at term pregnancy

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## Summary

**Purpose of investigation:** The aim of the present study was to estimate the risk for breech presentation in women with singleton pregnancies at-term who had had at least one previous cesarean section (CS) versus at least one previous vaginal delivery. **Methods:** Out of 4,269 singleton pregnancies during the study period, 2008 met the inclusion criteria. The history, the number of previous CSs, as well as maternal age, parity, birth weight, gestational age, neonatal sex and placenta previa were used to estimate the risk for breech at term. **Results:** The overall incidence of breech presentation was 3.2%, while 20% of the women had a history of at least one previous CS. The rate of breech presentation at term in singleton pregnancies after CS increased two-fold (5.3%) when compared to those with at least one previous vaginal delivery (2.6%), ( $p = 0.01$ ) [OR 2.08 (95% CI, 1.23-3.52)], while the number of the previous CSs did not correlate with breech presentation ( $p = \text{NS}$ ) [OR 0.86 (95% CI, 0.31-2.4)]. **Conclusion:** According to the present study, women with a history of at least one cesarean delivery have an increased risk for breech presentation in the subsequent singleton pregnancy at-term.

**Key words:** Breech presentation; Elective cesarean section; Abdominal delivery.

## Introduction

The rate of cesarean section (CS) has shown a stable increase over the last three decades. Apart from the obstetrical or iatrogenic indications for cesarean delivery, peroperative and anesthetic improvement, as well as advanced neonatology care contributed to the former event. The recommended indications for abdominal delivery include mainly fetal distress, labor arrest, maternal exhaustion, cephalopelvic disproportion, fetus malpresentation and maternal request [1-4]. Prophylactic (elective) CS because of previous cesarean is an additional contribution to the increased rate of abdominal delivery [2-5].

Fetal malpresentation and especially breech presentation (complete or frank) involve almost 4% of all deliveries at-term [6]. Although there is controversy related to the optimal way of delivery of fetuses in breech, elective CS for this indication has increased dramatically in both the United States and many European countries [7-9]. A recently re-published meta-analysis (2009) based on a Cochrane Database Review of 2003, assessed pregnancy outcomes after planned CS for singleton pregnancies at term [10]. The authors concluded that planned CS offered less neonatal morbidity and mortality compared to planned vaginal delivery.

An increased rate of breech presentation at term in women with previous abdominal delivery has been reported recently [11]. The primary objective of the present study was to estimate the rate of breech presentation in women with at least one previous CS compared to women with a previous vaginal delivery. Second, to recognize other possible risk factors that contribute to breech presentation in singleton pregnancies at-term.

## Material and Methods

The objective of the present study was to evaluate whether a previous CS constitutes a risk factor for breech presentation in singleton pregnancies at term, when compared to a similar group of women with at least one previous vaginal delivery. This was a retrospective study in which the obstetric records of our department were used to identify all the singleton pregnancies at term ( $> 37$  weeks) of women with a history of at least one previous delivery, with breech or cephalic presentation, between January 2004 and December 2007. Out of 4,269 singleton pregnancies, 2008 that met the inclusion criteria were enrolled in the final analysis. Stillbirths or fetuses with congenital malformations were not included in the study. Patients with previous uterine surgery (myomectomy via the abdomen or laparoscopy), uterine malformation or myomas in the present pregnancy were also excluded from the trial.

Demographic characteristics such as maternal age, the number of previous term deliveries, gestational age (weeks and days), neonatal weight, the rate of macrosomic and low birth weight (LBW) neonates were included in the present analysis. Neonates with a birth weight of more than 4,500 g were defined as macrosomic while those with a weight of less than 2,500 g as LBW.

The history of at least one previous CS or vaginal delivery was used to estimate the risk for breech presentation at-term of singleton pregnancies. Similarly, statistical analysis was performed according to the number of previous CSs (1 vs  $> 1$ ). Other factors such as parity (number of previous deliveries), maternal age ( $< 35$  vs  $\geq 35$  years), gestational age ( $\leq 40$  vs  $> 40$  weeks), neonatal sex (male vs female), placenta previa, macrosomic and LBW neonates were used to calculate the risk for breech presentation at term.

## Statistical analysis

Statistical analysis was performed using the Statistical Package for Social Science version 14.0 (SPSS Inc., Chicago, IL, USA). Continuous data expressed by mean value  $\pm$  SD (standard deviation). The Student's  $t$ -test or Mann-Whitney non parametric test were used to compare variables with continuous outcomes of the different groups. The chi-square and Fisher's

exact test analysis were used for cross-tabulated comparison of the different variables that were used as risk factors for breech presentation according to our methodology. The odds ratio (OR) based on a 95% confidence interval (CI) was also estimated. All *p* values are two-sided and *p* < .05 was considered as statistical significant.

## Results

Among the 2,008 singleton term pregnancies of our cohort that met the inclusion criteria, 64 fetuses (3.2%) were identified with a breech presentation, while 1,944 (96.8%) with a cephalic presentation. In addition, 1,595 (79.4%) women had at least one previous vaginal delivery in their obstetric history, while 413 (20.6%) had at least one previous CS. Demographic characteristics of the women are presented in Table 1. The mean maternal age ( $\pm$  SD) of the women with previous vaginal delivery was  $29 \pm 5.2$  years versus  $30 \pm 5.1$  of those with previous CS (*p* < .0001). However, the rate of the women aged  $\geq 35$  or < 35 years did not significantly differ. The mean gestational week at delivery was significantly higher in women with a previous vaginal delivery ( $39 \pm 1$ ) compared to those with a previous CS ( $38 \pm 0.6$ ). Similarly, the neonatal weight was significantly higher in the group of women with a history of vaginal delivery compared to a previous CS ( $3370 \pm 460$  vs  $3176 \pm 420$ , respectively, *p* < .0001). Macrosomic births were not different between the two study groups, while LBW neonates occurred more often in women with a previous CS (5.1%) compared to those with a previous vaginal delivery (2.5%) (*p* = 0.01).

Breech presentation at term delivery in singleton pregnancies of women with a history of a previous CS (22/413) occurred more often compared to the group of women with a previous vaginal delivery (42/1,595) (5.3% vs 2.6%, respectively) which was statistically significant (*p* = 0.01) and with an OR 2.08 (95% CI, 1.23-3.52) (Table 2). In a sub-analysis of women with a history of a cesarean section, the number of previous cesarean scars (1 vs > 1 previous CS) did not significantly contribute to the breech presentation of singleton pregnancies at term (5.5% vs 4.8%, respectively) [OR 0.86 (95% CI, 0.31-2.4)] (Table 2). The risk factors that contributed to breech presentation at term in singleton pregnancies are shown in Table 3. There was a trend between the number of previous deliveries irrespective of the way (abdominal or vaginal) and breech presentation at term (> 1 previous delivery; 3.9% vs 1 previous delivery; 2.9%, *p* = 0.1). A positive association was noted between increased maternal age and breech presentation ( $\geq 35$  years; 5.4% vs < 35 years; 2.7%, *p* = 0.01). There was no association between neonatal sex or gestational week (> 40 weeks vs  $\leq 40$  weeks) and breech presentation. The incidence of macrosomic births was not different between breech and cephalic presentation (1.6% vs 0.8%, respectively). The same observation was made with regards to LBW infants (3.1% vs 3%, respectively). Finally no association was found between placenta previa and breech presentation.

Table 1. — Demographic characteristics of the women with previous vaginal and cesarean delivery.

Demographic characteristics	Previous vaginal delivery (n = 1,595)	Previous CS (n = 413)	<i>p</i> value
Maternal age (mean $\pm$ SD; years)	$29 \pm 5.2$	$30 \pm 5.1$	< .0001
$\geq 35$ years, n (%)	280 (18)	87 (21)	NS
< 35 years, n (%)	1,315 (82)	326 (79)	
Number of previous term deliveries (mean $\pm$ SD)	$2.4 \pm 0.8$	$2.3 \pm 0.6$	.01
Gestational age (mean $\pm$ SD)			
Weeks	$39 \pm 1$	$38 \pm 0.6$	< .0001
Days	$277 \pm 7.5$	$270 \pm 5$	< .0001
Neonatal weight (mean $\pm$ SD; g)	$3,370 \pm 460$	$3,176 \pm 420$	< .0001
LBW ( $\leq 2,500$ g), n (%)	40 (2.5)	21 (5.1)	.01
Macrosomic (> 4,500 g), n (%)	14 (0.9)	2 (0.5)	NS

CS = cesarean section, LBW = low birth weight, SD = standard deviation.

Table 2. — The rate of breech presentation according to the way of the previous delivery and the number of previous cesarean sections.

	Cephalic presentation (n = 1,944)	Breech presentation (n = 64)	OR (95% CI)	<i>p</i> value
Previous vaginal delivery <sup>a</sup> , n %	1,553 (97.4)	42 (2.6)	1	.01*
Previous CS <sup>a</sup> , n %	391 (94.7)	22 (5.3)	2.08 (1.23-3.52)	
only 1 previous CS	292 (94.5)	17 (5.5)	1	NS*
> 1 previous CS	99 (95.2)	5 (4.8)	0.86 (0.31-2.4)	

<sup>a</sup> at least one, \* *p* value calculated for the subgroups in breech presentation only, NS = non significant, OR = Odds ratio, CI = confidence interval, CS = cesarean section.

Table 3. — Risk factors that contribute to breech presentation at term delivery.

Risk factors	Cephalic presentation (n = 1,944)	Breech presentation (n = 64)	<i>p</i> value
Parity, n %			
1 previous delivery	1356 (97.1)	40 (2.9)	NS*
> 1 previous delivery	588 (96.1)	24 (3.9)	
Maternal age, n (%)			
< 35 years	1,597 (97.3)	44 (2.7)	.01*
$\geq 35$ years	347 (94.6)	20 (5.4)	
Gestational age at term, n (%)			
$\leq 40$ weeks	1,821 (96.7)	62 (3.3)	NS*
> 40 weeks	123 (98.4)	2 (1.6)	
Neonatal weight, n (%)			
LBW ( $\leq 2500$ g)	59 (3)	2 (3.1)	NS
Macrosomic (> 4500 g)	15 (0.8)	1 (1.6)	NS
Neonatal sex			
Male	1,031 (96.7)	35 (3.3)	NS*
Female	913 (96.9)	29 (3.1)	
Placenta previa, n (%)	4 (0.2)	0	NS

\* *p* value calculated for the subgroups in breech presentation only, LBW = low birth weight.

## Discussion

The present study showed that women with a history of CS have an increased risk of breech presentation in a subsequent singleton pregnancy at term, while the number of the previous CSs did not affect the incidence of breech presentation.

To the best of our knowledge there is only one recent publication employed with the risk of breech presenta-

tion at term delivery of a singleton pregnancy in women with a history of CS [11]. The authors observed a 4.56% rate of breech presentation after previous CS compared to 2.09% after vaginal delivery, giving a twofold relative risk (RR) 2.18 (95% CI, 1.98-2.39) and an adjusted OR of 2.12 (95% CI, 1.91-2.36) for breech presentation after previous cesarean delivery. Similarly, in our study there was a double risk for breech presentation in women with previous abdominal delivery compared to those with a previous vaginal delivery. The rate of fetuses in breech with a history of at least one cesarean section was 5.3%, while in women with at least one previous vaginal delivery 2.6% [OR 2.08 (95% CI, 1.23-3.52)]. Further analysis to estimate a possible influence of the number of previous CS (1 vs > 1) showed a similar rate of breech presentation in women with history of one previous CS (5.5%) compared to women with more than one (4.8%) ( $p = \text{NS}$ ). A similar result was shown by others [11].

Further analysis to reveal other risk factors that contribute to breech presentation at term showed a significant correlation only with maternal age ( $\geq 35$  years), which is in accordance with a previous report [11]. However, parity, gestational week, neonatal weight and placenta previa did not have any significant contribution to the breech presentation. Vendittelli *et al.* showed similar results with the present series concerning placenta previa, while using a different base analysis for gestational age ( $> 39$  weeks  $<$ ) and birth weight ( $> 3,000$  g  $<$ ) demonstrated a significant association of these with breech presentation.

The optimal way of delivery of a fetus in breech presentation appears to be a planned CS. Two previous randomized studies with a small sample size assessed the optimal way of delivery of fetuses in breech (frank and non frank) and found no significant benefits for the fetus with either method of delivery, planned CS or vaginal delivery [12, 13]. However, subsequent studies demonstrated increased risk for perinatal death and morbidity for fetuses in breech presentation during vaginal delivery, supporting that planned CS may improve perinatal outcomes [7, 14]. Thereafter, a multicenter trial (121 centers, 26 countries) randomly assigned planned CS or planned vaginal delivery in 2,088 singleton pregnancies at term with the fetus in frank or complete breech presentation. (15) In this study, perinatal outcomes (mortality and morbidity) were significantly lower in planned CS compared to planned vaginal delivery. In the same trial, the author also concluded that serious maternal complications were similar between the two delivery options. Two meta-analyses in the Cochrane Database which included three randomized studies by Collea *et al.*, Gimovsky *et al.*, and Hannah *et al.* [12, 13, 15], similarly concluded that planned CS is optimal to planned vaginal delivery as it reduces perinatal or neonatal death and serious neonatal morbidity, despite a somewhat increased rate of maternal complications [10, 16].

Increased rate of CS is associated with a rise in severe obstetric morbidity. Recently, Kuklina *et al.* showed a

trend of severe complications in the United States in a period study between 1998 and 2005 [17]. The rate of at least one severe obstetric complication such as pulmonary embolism, blood transfusion, adult respiratory distress syndrome (ARDS) and renal failure increased from 0.64% at the beginning of the study period (1998) to 0.81% towards the end (2005) [17]. The authors concluded that the increased rate of CS contributed significantly to the former complications. Additionally, abnormal placentation such as placenta previa and accreta is another complication, of low rate, but with significant maternal morbidity and mortality for which a history of previous CS constitutes the main reason [18]. A previous study reported an incidence of placenta accreta of 5% in an unscarred uterus, while in women with history of four cesarean deliveries the same figure climbed to 67% [19]. Furthermore, Miller *et al.* reported an incidence of placenta accreta of 10% in women with a coexisting placenta previa and found a 2.1% incidence of placenta accreta in patients with no history of uterine scar but 38% in women with more than two CSs.

There are certain limitations in our study, with the retrospective nature and the relatively small sample size being the most important ones. However, the present series reflect the experience of a University Hospital, with more than 1,000 deliveries per year. Furthermore it was not in the scope of the present analysis to estimate the optimal way of delivery of fetuses in breech presentation.

The rising of the rate in CS is a worldwide event contributing to the increased rate of maternal morbidity and mortality as well as to serious obstetric complications, although for the benefit of the fetus the decision for abdominal delivery may be warranted [1, 2, 17]. According to the Greek experience during a 24-year period, there was an overall two-fold increase in the rate of cesarean section from 13.8% (1977-1983) to 29.9% (1994-2000). Fetal distress, breech presentation, cephalopelvic disproportion and hypertensive disorders were the main reasons for primary cesarean section, while previous CS was the most common indication with an increase in the rate from 7.7% to 10.9% in the study period [21]. A Norwegian study demonstrated that 65% of cesarean deliveries were emergency operations, mainly due to fetal distress and progress failure, while previous CS and maternal request were the principal indications for elective cesarean section [4]. The era of serious skepticism and possible redefinition of the indications for cesarean delivery has arrived. Physicians must be alert and clear in their decision to perform another abdominal delivery.

In conclusion, according to the results of the present study, women with a history of previous cesarean section have an increased risk for breech presentation at term delivery of singleton pregnancies compared to a previous vaginal delivery. The number of previous CSs is not significantly correlated with the risk of breech at term. Further studies are needed to confirm or reject the current knowledge.

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