



## Mortality and morbidity in early preterm breech singletons: impact of a policy of planned vaginal delivery



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### ABSTRACT

**Objective:** To compare neonatal morbidity and mortality rates in preterm singleton breech deliveries from 26<sup>0/7</sup> to 29<sup>6/7</sup> weeks of gestation in centers with a policy of either planned vaginal delivery (PVD) or planned cesarean delivery (PCD).

**Study design:** Women with preterm singleton breech deliveries occurring after preterm labor or preterm premature rupture of membranes (pPROM) were identified from the databases of five perinatal centers and classified as PVD or PCD according to the center's management policy. The independent association between planned mode of delivery and the risk of neonatal hospital death or morbidity was tested and quantified with ORs through two-level multivariable logistic regression modeling.

**Results:** Of 142 782 deliveries during the study period, 626 (0.4%) were singletons in breech presentation from 26<sup>0/7</sup> to 29<sup>6/7</sup> weeks of gestation: after exclusions, 130 were in the PVD group and 173 in the PCD group. Severe newborn morbidity was similar in the two groups. Newborn mortality was 12% in the PCD group and 16% in the PVD group. Three neonates (1.7%, 95% CI: 0.34–5.0) died from head entrapment after vaginal delivery in the PVD group. Nonetheless, the policy of PVD was not associated with increased risks of neonatal death (aOR: 1.01, 95% CI: 0.33–2.92) or severe morbidity.

**Conclusion:** Risks of mortality and severe morbidity in preterm breech were not increased by a policy of vaginal delivery. Head entrapment leading to death is however possible in cases of vaginal delivery but its rarity should be balanced with the maternal consequences of early preterm cesarean delivery.

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### Introduction

The mode of delivery of early preterm fetuses in breech presentation is controversial. Several retrospective cohort studies published over the past 30 years have recommended cesarean delivery [1], but most had methodological weaknesses, in particular, small or heterogeneous populations of neonates weighing <1500 g. More methodologically sound studies – stratifying for gestational age and birth weight or using a matched control design or multivariate analysis to adjust for confounding

factors – have failed to show that cesarean delivery improves neonatal outcome [2–5].

Obstetricians nonetheless worry about the risk of neonatal death related to complications of vaginal breech delivery, especially in very low-birth-weight infants. The higher rate of neonatal death in planned vaginal deliveries of term breech singletons reported in the randomized controlled trial by Hannah et al. [6] in 2001 affected medical practices, in preterm as well as term preterm breech deliveries. Cesarean delivery thus became the preferred mode of delivery for preterm breech infants in many hospitals, despite the lack of evidence to support it [7]. Ideally, a randomized trial would help to define the best management in this situation. Unfortunately, several randomized studies of this question have been stopped due to low recruitment [8–10].

A recent multicenter retrospective study in the United States reported a risk of death two to four times higher in cases of

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attempted vaginal delivery than with planned cesarean delivery for breech presentations from 24 to 31 weeks of gestation [11]. However, its retrospective design was based on databases not designed specifically for the study. This study design could have led to bias due to confounding and an overestimation of the risk of death in the vaginal delivery group. In a previous study, we showed that even though head entrapment is a risk factor for neonatal death, neonatal mortality was not higher in cases of policy of planned vaginal delivery, compared with planned cesareans [12]. As this negative result may be attributed to a lack of power, we conducted a larger study, which included two additional hospitals and covered a longer period, to compare morbidity and mortality for preterm singleton newborns in breech presentation delivered in units with a policy of either planned vaginal delivery (PPVD) or planned cesarean delivery (PPCD).

## Materials and methods

Five teaching tertiary care centers participated in this retrospective study of deliveries from 1999 through 2010. PPVD was standard policy at Center 1 (Port-Royal Maternity Hospital) and Center 4 (University Hospital of Rouen) throughout the study period, and at Center 2 (University Hospital of Créteil) from 1999 to 2001. Center 2 had a PPCD policy from 2002 to 2010, and Centers 3 (CHI Poissy) and 5 (University Hospital of Angers) throughout the study period.

The hospitals used the following key words to search their databases for 1999–2010 to identify cases: breech, preterm delivery, and singleton. They then retrieved the paper files for each patient. Two investigators (V.C. and E.L.) carefully reviewed maternal and neonatal charts to extract the relevant information by using a standardized data sheet.

The study included women with singleton pregnancies admitted for preterm labor with or without preterm premature rupture of membranes (pPROM) and who gave birth between 26<sup>0/7</sup> and 29<sup>6/7</sup> weeks of gestation. Gestational age was calculated according to the last menstrual period and, if available, early ultrasonographic measurement, which is routinely performed in France [13]. We excluded cases in which mother or fetus had diseases that might have increased neonatal mortality or morbidity, such as intrauterine growth restriction, preeclampsia, lethal congenital abnormalities, fetal death before labor, placenta previa, or abruptio placentae, as these were confounding factors that could have introduced bias. Neonates delivered before 26 were not included because centers policy regarding extremely preterm resuscitation varied and may have biased the comparison. Neonates delivered after 30 WG were not included because PPCD was used in center 2 only before 30 WG.

Except for the delivery policy, the five centers had the same management protocols for preterm labor or pPROM between 26<sup>0/7</sup> and 29<sup>6/7</sup> weeks of gestation. The units with a PPVD policy performed cesareans when FHR was abnormal during labor, or labor was protracted, or in cases of chorioamnionitis before labor. Units with a PPCD policy limited vaginal deliveries to cases in which labor progressed too rapidly for cesarean delivery.

Neonatal medical records were reviewed to identify neonatal outcomes.

The variables analyzed included maternal and obstetric characteristics, type of breech presentation at delivery, the need for additional maneuvers such as instrumental delivery and/or additional uterine or cervical incision to deliver the neonate, or entrapment of the aftercoming head, defined as difficult head delivery requiring additional maneuvers.

Continuous variables were analyzed by ANOVA, and categorical variables were compared with chi-square, Fisher's exact test or Mann–Whitney *U*-test as appropriate. The independent effect of

the planned mode of delivery was tested and quantified with a two-level multivariable logistic regression with a random intercept to take into account the hierarchical structure of the data, with women clustered in maternity units. We adjusted for covariables previously described as risk factors for neonatal death and for variables found to be potential confounders in bivariate analyses. All tests were two-sided and  $p = 0.05$  was considered significant.

Stata 12.0 software was used for the statistical analysis.

An Institutional Review Board approval was provided by the CEROG (Comité d'éthique de la recherche en obstétrique et gynécologie, Submission number: CEROG OBS 2013-08-04).

## Results

Of 142,782 deliveries during the study period, 632 (0.4%) were of fetuses in breech presentation at 26–29<sup>6/7</sup>; 313 (49.5%) were excluded, because of preeclampsia ( $n = 139$ ), fetal growth restriction ( $n = 73$ ), fetal death before labor ( $n = 46$ ), or other reasons (abruption, placenta previa, and lethal congenital malformations,  $n = 55$ ). Sixteen (2.5%) were excluded because the medical files could not be retrieved. The study thus included 303 women, 173 who gave birth under a PPVD and 130 under a PPCD policy.

In the PPVD group, 41 (24%) women had a cesarean before labor for abnormal FHR, and 35 (20%) had a cesarean during labor for abnormal FHR or protracted labor. In the PPCD group 8 (7%) patients were delivered vaginally because labor progressed too rapidly to perform a cesarean. Except for mode of delivery, the two groups did not differ significantly in their demographic or obstetric characteristics (Table 1).

**Table 1**  
Demographic and obstetric characteristics of the study population.

	Policy of planned cesarean delivery ( $n = 130$ )	Policy of planned vaginal delivery ( $n = 173$ )
Age (mean $\pm$ SD, years)	30.2 $\pm$ 4.5	30.6 $\pm$ 6.0
Ethnic origin: $n$ (%)		
White	91 (70)	119 (69)
Sub-Saharan Africa and the West Indies	22 (17)	28 (16)
North Africa	11 (8)	21 (12)
Asia and others	6 (5)	5 (3)
Nulliparas $n$ (%)	80 (62)	114 (66)
Previous cesarean delivery $n$ (%)	18 (14)	22 (13)
pPROM $n$ (%)	87 (67)	116 (67)
pPROM before 24 weeks' gestation, $n$ (%)	12 (9)	12 (7)
GA at delivery, $n$ (%)		
26	28 (22)	46 (27)
27	29 (22)	44 (25)
28	34 (26)	33 (19)
29	39 (30)	50 (29)
Prenatal corticosteroids, $n$ (%)	106 (82)	141 (82)
Type of breech*		
Frank or Incomplete	48 (35)	86 (48)
Footling	55 (40)	86 (48)
Mode of delivery**		
Vaginal delivery	8 (8)	97 (56)
Cesarean during labor	89 (68)	35 (20)
Cesarean prior to labor	33 (24)	41 (24)
Type of incision in cases of cesarean		
Segmental	31 (86)	71 (80)
Corporeal segmental	1 (3)	3 (3)
Vertical	4 (11)	15 (17)

SD: standard deviation; GA: gestational age; pPROM: preterm premature rupture of membranes.

\* Missing data in 41 cases.

\*\* No comparison between PCD and PVD was significant except for the mode of delivery ( $p < 0.01$ ).

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