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Is it reasonable to propose vaginal delivery with twin pregnancies, when the first twin is in breech presentation?

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Abstract:

Background: Breech presentation of the first twin occurs in 20% of twin pregnancies. However, the impact of delivery mode on morbimortality in breech fetuses remains controversial in the literature generally, and has been infrequently studied in twin pregnancies specifically. The aim herein was to evaluate neonatal and maternal outcomes according to delivery mode when the first twin was in breech presentation, and to compare these results with those in the current literature.

Material and methods: This was a single-center, retrospective study in Lille, France, from January 2010 to December 2017, including twin pregnancies in which the first twin was in breech presentation and delivery was after 32 weeks of amenorrhea. Two groups were defined: planned vaginal delivery (PVD) and planned cesarean delivery (PCD). The primary outcome was neonatal morbidities, defined as a 5-minute Apgar score < 7, cord pH < 7.10 at birth, sepsis, and acute respiratory distress syndrome.

Results: Among the 184 patients included, 116 attempted a vaginal delivery (63%). Morbidity did not differ between PVD and PCD for the first twin (12/116 (10.3%) versus 7/68 (10.3%), respectively, p=0.99), the second twin (18/116 (15.5%) versus 7/68 (10.3%), respectively, p=0.31), or either twin (27/116 (23.2%) versus 11/68 (16.2%), respectively, p=0.25). The rate of postpartum hemorrhage was significantly lower in the PVD group (PVD 36/116 (31%) versus PCD 41/68 (58.8%), p=0.001).

Conclusion: PVD is a reasonable option when the first twin is in breech presentation with probably no higher neonatal mortality and morbidity and less risk of maternal severe postpartum hemorrhage.

Keys words: Twin pregnancy, breech, mode of delivery

Key message:

Planned vaginal delivery is not associated with higher neonatal mortality and morbidity for either twin in twin pregnancies in which the first twin was in breech presentation, in a center with carefully selected patients.

INTRODUCTION

The incidence of twin pregnancies is about 2%, and the rate has been increasing since 2000 because of more common recourse to assisted reproductive technology and advanced maternal age. In twin pregnancies, the prevalence of a first breech twin is about 20% (1). The safest delivery mode mainly depends on both twins' presentations and team experience (2). Discussion of breech presentation, either singleton or twin, is ongoing in the current literature. Hannah et al. asserted that planned vaginal singleton breech birth increases the risk of low Apgar scores and serious short-term complications; however, according to Whyte et al. planned cesarean delivery (PCD) does not differ regarding either morbidity or neurodevelopmental abnormalities at 2 years of age (3,4). Furthermore, the PREMODA study, which included 174 maternity units in France and Belgium, concluded that under standard practice conditions, neonatal outcomes were not significantly poorer among infants with planned vaginal delivery (PVD) compared with PCD (5). Recent national French guidelines on singleton breech presentation allow vaginal birth under specific ultrasound-verified conditions: normal scanopelvimetry, estimated fetal weight < 3,800 g (especially before 37 weeks) and no hyperextension of the fetal head (5,6).

Over the past two decades, several authors have attempted to identify the optimal delivery mode for twin pregnancies, though they have mainly focused on cephalic first twin presentation (7–10). Two recent studies, with large, varied samples (i.e., the Twin Birth Study and JUmeaux MODe d'Accouchement [JUMODA]) both concluded that PCD does not significantly decrease or increase risk of fetal or neonatal death, or serious neonatal morbidity, compared with PVD when the first twin was in cephalic presentation (7,11). Regarding the breech first twin context, few studies have investigated the impact of planned delivery mode on neonatal and maternal outcomes (1,2,9,12–15). These have concluded that cesarean section

and PVD are both safe options. However, most of these studies included limited samples, a large proportion of which had PCD, with rate of 79.7% in the most recent study (15).

Therefore, the aim herein was to evaluate maternal and neonatal outcomes according to planned delivery mode for breech first twins at our center, which has a standard vaginal delivery policy.

MATERIAL AND METHODS

Population

This was a retrospective, single-institution study in Lille, France. We included all breech first twin pregnancies from January 2010 to December 2017. We excluded twin deliveries from 24 to 32 weeks gestation (because of very preterm infants' specific management needs and outcomes), monoamniotic pregnancies, a major structural abnormality or fetal aneuploidy (suspected or confirmed) in either twin, embryonic reduction, stillbirth before labor, pregnancy termination, twin-to-twin transfusion syndrome and/or twin anemia polycythemia sequence in monochorionic pregnancies, primary ciliary dyskinesia, or significant maternal risk factors (e.g. severe preeclampsia, HELLP syndrome, placenta previa).

Birth Protocol

All twin pregnancies were monitored according to French guidelines (16). Uncomplicated monochorionic pregnancies were delivered around 38 weeks and dichorionic around 39 weeks (17,18). Delivery mode planning was according to our previously published protocol (19) and patient choice. To plan a vaginal delivery for either a singleton in breech presentation or twins when the first twin is in breech presentation, meeting the following criteria is required: comparison of fetal biparietal diameter with maternal pelvic measurements (obstetric

conjugate–biparietal diameter ≥ 15 mm; median transverse–biparietal diameter ≥ 25 mm; and interspinous–biparietal diameter ≥ 0 mm); no hyperextension of the fetal head (verified by ultrasonography); estimated fetal weight < 3,800 g (each twin) in nulliparous pregnancies; and maternal informed consent following explanation of benefits and risks of both planned delivery modes. In twin pregnancies, we perform pelvimetric measurement if the first breech twin is > 2,500 g. Breech presentation type (complete or frank), chorionicity, history of one previous cesarean, and second twin presentation are not taken into account in decisions about planned delivery mode in our center (20). In PVD cases, management includes continuous electronic fetal heart rate monitoring; epidural analgesia is at the patient's discretion; and during the second phase of labor, a junior obstetrician in training, a senior obstetrician, senior anesthesiologist, senior pediatrician, and two midwives are present in the delivery room.

Study sample

Two study groups were defined according to intended delivery mode: PVD and PCD. The PVD group included both effective vaginal delivery and cesarean delivery during labor. Cesarean during labor was classified as due to abnormal fetal rate for at least one of the twins (with or without cervical dystocia), or cervical dystocia and abnormal presentation checked by ultrasound before pushing efforts (e.g., fetal head hyperextension or high risk of interlocking twins). PCD was classified as: maternal request; history of previous cesarean section; or maternofetal disproportion on pelvimetry.

Endpoint

The primary endpoint was each twin's neonatal outcomes that combined neonatal mortality and neonatal morbidity as defined by a composite neonatal criteria which included at least one of the following criteria: death within the first 28 days after birth in a liveborn infant, 5-

minute Apgar score < 7, umbilical artery pH < 7.10, neonatal sepsis during neonatal hospitalization (defined as a positive blood or cerebrospinal fluid culture) and the occurrence of a respiratory distress syndrome (need for oxygen support) (1).

The secondary endpoints were the admission rate of the neonatal intensive care unit (ICU) and maternal outcomes. The maternal morbidity-mortality criteria were grouped into composite criteria, which included at least one of the following criteria: death, postpartum hemorrhage (PPH), was defined as blood loss > 500 mL, , postpartum infection (maternal fever > 38°5), emergency surgery in addition to the childbirth procedure, . Severe PPH > 1,000 mL was evaluated separately.

Statistical analyses

Categorical variables are expressed as numbers and percentages, and continuous variables as means and standard deviations. Distribution normality was assessed using histograms and the Shapiro–Wilk test. Population characteristics and neonatal and maternal outcomes were compared between PVD and PCD groups using the chi-square test for categorical variables and Student's *t*-test for continuous variables. All statistical tests were conducted at the two-tailed α level of 0.05 using SAS software, release 9.4 (SAS Institute, Cary, NC).

RESULTS

During the seven-year study period, our center had a total of 210 twin pregnancies that were > 32 weeks in which the first twin was a breech delivery. After exclusions, 184 twin pregnancies were included, of which 116/184 were PVD (63%) and 68/184 were PCD (37%) (Figure 1).

Table 1 presents the sample characteristics according to planned delivery mode. The two groups did not differ significantly, except for previous cesarean, gestational age at delivery and birth weight for the first twin, which was lower in the PVD group (respectively 9/116 (7.8%) versus 14/68 (20.6%), p=0.009; 35.9 weeks ± 1.9 versus 36.6 weeks ± 1.9, p=0.025; 2403g ± 478 versus 2594g ± 458, p=0.009). Four patients (4/68 (6%)) in the PCD group had undergone two or more cesarean sections before this pregnancy.

Among the 116 patients in the PVD group, 32 (27.6%) had a cesarean section during labor, predominantly for cervical dystocia (18/32 (56.3%)) or abnormal fetal heart rate (10/32, (31.3%)); 19 were nulliparous (19/32 (59.4%)) (Table 2). 84/116 delivered vaginally (72.4%). Among these 84 patients, breech procedure (Lovset, Bracht) was needed by 66/84 patients (78.6%). The second twin was primarily in cephalic presentation (53/84 (63.1%)) and internal version was performed on 49 second fetuses (49/84 (58.3%)). The mean intertwin delivery interval was 4.6 minutes +/- 4.1 (Table 2).

Composite criteria of neonatal morbidity did not differ between PVD and PCD groups for the first twin (12/116 (10.3%) versus 7/68 (10.3%), respectively, p=0.99), the second twin (18/116 (15.5%) versus 7/68 (10.3%), respectively, p=0.31), or either twin (27/116 (23.2%) versus 11/68 (16.2%), respectively, p=0.25). No neonatal deaths occurred. At least one twin was transferred to the neonatal ICU in 30.2% (35/116) of the PVD group cases, versus 22.2% (15/68) in the PCD group cases (Table 3). Complications appeared less frequent according to gestational age, regardless of planned delivery mode, expect for delivery between 35 weeks and 36+6 weeks, which neonatal morbidity seemed more frequent in PVD group with 9/39 (23.1%) neonatal outcome in PVD group and 1/12 (8.3%) in PCD group at least one of the twins(Table 4).

Maternal morbidity was significantly higher in the PCD group (38/116 (32.3%) in PVD group versus 41/68 (58.8%) in PCD group, p=0.001), because of the occurrence of PPH in 60.3% of

that group's patients (41/68 patients (58.8%)). Moreover, the PCD group had significantly higher rates of severe PPH (> 1L) (10/116 patients (8.6%) in PVD versus 17/68 (25%) in PCD, p=0.002) (Table 5).

DISCUSSION

Main findings

This retrospective study shows that when the first twin is in breech presentation, PVD, when conducted at a center with significant experience, performing this planned procedure among a carefully screened patient population, is non associated with higher risks of either neonatal mortality or morbidity, for either first or second twins, compared with PCD. It also carries a lower incidence of maternal complications.

Interpretation

Type of delivery in twin pregnancies with a breech first twin is an issue in obstetrics. This situation is rare and studies on the subject often lack power. In addition, the influence of the Term Breech Trial for breech singletons and the lack of solid evidence within guidelines on the management of first twin breech presentations have led to an increase in cesarean deliveries (4,9,21,22). Previous PVD rate reports have shown that it is low, varying from 4% to 56% (1,9,21–24). This reinforces, as with breech singleton deliveries, a loss of expertise in the delivery of twin pregnancies (15). It is therefore important to evaluate the safety of vaginal attempt in order to increase number of PVD.

Previous studies found no increase in neonatal morbidity and mortality in the case of PVD in a twin pregnancy with breech first twin. Indeed, in our study, where 63% of the patients had PVD, there was no difference in neonatal morbidity and mortality for either first twin 1 or second twin, with a rate of 10% on fist twin and between 10%-15% on second twin. Our

results are comparable to those of Sentilhes et al. In their study, rate of PVD was 72% and they did not find that attempted vaginal delivery for breech first twin term pregnancies was associated with greater neonatal mortality or morbidity compared with PCD. Similarly, the most recent study on this subject, JUMODA, found no difference in neonatal morbidity and mortality between the PCD and PVD groups (11).

The morbidity was similar between twin 1 and 2 in our study. The presentation of twin 1 did not seem to influence morbidity. In their subgroup analysis, Barrett et al did not find greater morbidity in the second twin (odds ratio, 1.90; 95% CI, 1.34 to 2.69, P<0.001), irrespective of the PCD or PVD group (7). Similarly, the study by Korb et al, which compared neonatal morbidity in breech first twin, using different neonatal morbidity criteria, found a rate of 1.7% to 1.9% for the first twin and 2.3% to 2.5% for the second twin (15). These studies concluded that attempting vaginal delivery is a reasonable option for twin pregnancies in which the first twin is in breech presentation, given conditions such as a careful intrapartum protocol and an experienced obstetrician, midwife, and anesthesiologist (1).

On the other hand, these different studies found a lower morbidity and mortality rate than ours. The explanation for this difference rate is probably related to the use of different criteria to define neonatal morbidity, with more severe criteria in these studies (11,15). Sentilhes et al analysis also found a lower morbidity rate (5.6-8.4% on first twin and 4 to 4.2% on second twin), but they only included patients after 35 weeks, which could explain our higher morbidity rate despite an almost identical PVD rate and morbidity definition criteria. Indeed, it was interesting to note that morbidity was mostly increased for birth terms between 32 and 34+6 weeks, with morbidity rates of 36% in PCD group and 39% in PVD group for at least one of the two twins (Table 4). This subgroup study was not performed in the other studies, except in JUMODA study but with first twin in cephalic presentation.

Maternal outcomes were only evaluated in two of the five studies reviewed herein (1,21). Sentilhes et al. only found that the occurrence of deep vein thrombosis was significantly higher in their PCD group (4.2% versus 0% in PVD, $p < 0.005$). Rates of PPH did not differ significantly (12.1% in PVD versus 9.9% in PCD, $p > 0.005$). However, their results differed from those reported by Pascalet et al., in which PPH was significantly higher in PCD (45.2% versus 12.2% in PVD, $p < 0.05$), and herein (41% versus 36% in PVD, $p < 0.0001$) and severe PPH (17% versus 10% in PVD, $p < 0.002$) (21). That PPH, severe PPH, and deep venous thrombosis are known surgical procedure complications might explain why they are observed significantly more often in PCD groups.

Strengths and limitations

A major strength of our study was the high proportion of PVD cases. Our result of an absence of neonatal benefits associated with PCD gives practitioners solid information on which to base a shared decision with women about their planned delivery mode. Moreover, cases involving pregnancy-associated complications that required cesarean delivery were excluded, limiting the risk of selection bias. Another strength is a subgroup analysis based on a difference in mean gestational age between the two groups. This study was not without limitations, including external validity. Our center policy of vaginal delivery for breech singleton, vertex, or breech first twin pregnancies explains our high rates of both PVD and successful vaginal deliveries (19,20). Across many centers, the Term Breech Trial has led to a loss of expertise in vaginal deliveries of both twins and breech singletons (4). The choice of criteria defining our composite criterion was different from some studies. Our morbidity rate is thus higher and it is therefore difficult to compare it to the literature. Furthermore, due to the low number of neonatal events, adjustment for important prognostic factors such as gestational age at delivery, birth weight, nulliparity could not be performed as well as comparisons of our subgroup analyses. A simple descriptive analysis was performed. An

excess of neonatal morbidity in the 35-36+6 weeks stratum cannot be ruled out in PVD compared to PCD.

CONCLUSION

PVD in twin pregnancies in which the first twin is in breech presentation is unassociated with higher neonatal mortality or morbidity for either twin. Our results carry implications for clinical practice and may be useful toward planning the most appropriate delivery mode.

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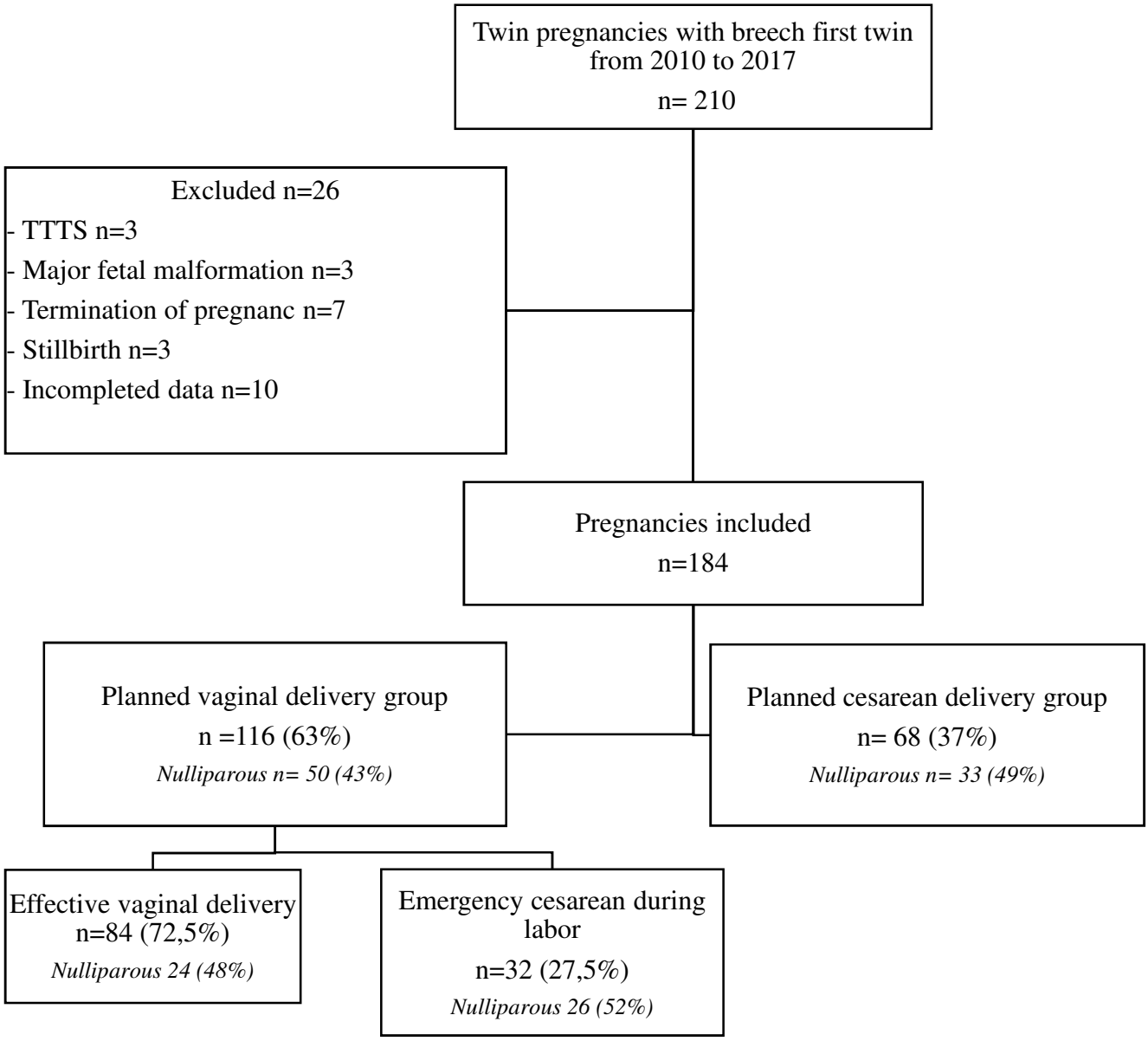
Figure1: Flow chart



TTTS: twin-to-twin transfusion syndrome.

Table 1. Population characteristics according to the planned mode of delivery

	PVD n=116	PCD n=68	p
Maternal age at delivery (years) Body mass index (kg/m2) Tobacco Nulliparity Previous cesarean • Two or more previous cesarean	30.5 +/- 4.6* 24.2 +/-5.7 15 (12.9)** 50 (43.1) 9 (7.8) 0	31 +/-4.5 24.8 +/- 5.1 6 (8.8) 33 (48.5) 14 (20.6) 4 (5.9)	0.42 0.51 0.42 0.48 0.009
Gestational age at delivery (weeks) Birth weight Twin 1 (g) Birth weight Twin 2 (g) Intra uterine growth restriction Twin 1 Intra uterine growth restriction Twin 2 Gestational diabetes	35.9 +/- 1.9 2403 +/- 478 2387 +/- 441 38 (32.8) 47 (40.5) 20 (17.2)	36.6 +/- 1.9 2594 +/- 458 2458 +/- 523 17 (25) 26 (38.2) 14 (20.6)	0.025 0.009 0.33 0.28 0.78 0.72
Assisted reproduction Dichorionic diamniotic	40 (34.5) 102 (87.9)	18 (26.5) 58 (85.3)	0.26 0.50

PVD: Planned vaginal delivery, PCD: Planned Cesarean Delivery, ICU: Intensive care unit.

Results are presented as mean +/- standard derivation or numbers (percentages)**. P was significant if <0.05.*

Table 2. Mode of delivery in case of Planned Vaginal Delivery (PVD)

Mode of delivery for PVD	N = 116
Labor induction	40 (34.5)**
Emergency cesarean	32 (27.6)
Cause of emergency cesarean	
Abnormal fetal heart rate	10/32 (31.3)
Cervical dystocia	18/32 (56.3)
Abnormal presentation	4/32 (12.5)
Effective vaginal delivery	84 (72.4)
Mode of delivery of Twin 1	
Complete breech	22/84 (26.2)
Franck breech	27/84 (32.1)
Footling breech	1/84 (1.2)
Breech procedure (Lovset, Bracht)	66/84 (78.6)
Forceps to aftercoming head	4/84 (4.8)
Mode of delivery of Twin 2	
Cephalic presentation	53/84 (63.1)
Breech presentation	32/84 (38.1)
Transverse presentation	32/84 (38.1)
Instrumental birth	6/84 (7.1)
Version by internal operation	49/84 (58.3)
Second twin cesarean	0/84
Forceps to aftercoming head	4/84 (4.8)
Intertwin delivery interval (min)	4.6 +/- 4.1*
Neonatal weight (g)	
Twin 1	2403 ± 477.8
Twin 2	2387 ± 440.9

*Results are presented as mean +/- standard derivation*or numbers (percentages)***

Table 3. Principal neonatal endpoint outcome according to the planned mode of delivery

	First twin			Second Twin			At least one of the twins		
	PVD N=116	PCD N=68	p	PVD N=116	PCD N=68	p	PVD N=116	PCD N=68	p
Composite neonatal criteria*	12 (10.3)	7 (10.3)	0.99	18 (15.5)	7 (10.3)	0.31	27 (23.2)	11 (16.2)	0.25
Apgar < 7 at 5min	4 (3.4)	2 (2.9)		5 (4.3)	1 (1.5)		8 (6.9)	2 (2.9)	
pH<7.10	6 (5.2)	3 (4.4)		6 (5.2)	4 (5.9)		11 (9.5)	6 (8.8)	
Neonatal sepsis	2 (1.7)	1 (1.5)		0	0		2 (1.7)	1 (1.5)	
Respiratory distress syndrome	3 (2.6)	5 (7.3)		12 (10.3)	3 (4.4)		6 (5.2)	15 (22.1)	
Death	0	0		0	0		0	0	
ICU Admission	28 (24.1)	14 (20.6)	0.58	29 (23)	13 (19.1)	0.36	35 (30.2)	15 (22.2)	0.23

** composite neonatal criteria included at least one of the following criteria: death within the first 28 days after birth in a liveborn infant, 5-minute Apgar score < 7, umbilical artery pH with cutoff 7.10, neonatal sepsis during neonatal hospitalization (defined as a positive blood or cerebrospinal fluid culture) and the occurrence of a respiratory distress syndrome (need for oxygen support).*

PVD: Planned vaginal delivery, PCD: Planned Cesarean Delivery, ICU: Intensive care unit.

Results are presented as numbers (percentages), the gestational age stratification results are presented as numbers of positive events /group effective (percentage). Significative p value < 0.05

Table 4. Neonatal outcome* according to the term of birth

	First twin		Second twin		At least one of the twins	
	PVD n= 116	PCD n= 68	PVD n= 116	PCD n= 68	PVD n= 116	PCD n= 68
32 – 34+6 weeks (n=39)	3/28 (10.7)	4/11 (36.3)	10/28 (35.7)	2/11 (18.2)	11/28 (39.2)	4/11 (36.3)
35-36+6 weeks (n= 51)	5/39 (12.8)	0/12 (0)	5/39 (12.8)	1/12 (8.3)	9 /39 (23.1)	1 /12 (8.3)
>37 weeks (n= 93)	4/49 (8.2)	2/44 (4.5)	3/49 (6.1)	4/44 (9.1)	7/49 (14.3)	5/44 (11.4)

** composite neonatal criteria included at least one of the following criteria: death within the first 28 days after birth in a liveborn infant, 5-minute Apgar score < 7, umbilical artery pH with cutoff 7.10, neonatal sepsis during neonatal hospitalization (defined as a positive blood or cerebrospinal fluid culture) and the occurrence of a respiratory distress syndrome (need for oxygen support).*

PVD: Planned vaginal delivery, PCD: Planned Cesarean Delivery.

The stratification analysis results are presented as numbers of positive events /group effective (percentage). Statistical analysis was not performed due to small samples.

Table 5. Maternal outcomes according to the planned mode of delivery

	PVD n=116	PCD n=68	*p* value
Composite maternal criteria*	38 (32.3)	41 (58.8)	0.0001
Death	0	0	
Post-partum hemorrhage >500 mL	36 (31.0)	41 (58.8)	
Post-partum infection	0	0	
Emergency surgery in addition to the childbirth procedure	2 (1.7)	0 (0.0)	
Severe post-partum hemorrhage >1L	10 (8.6)	17 (25)	0.002

PVD: Planned vaginal delivery, PCD: Planned Cesarean Delivery.
**Composite maternal criteria included at least one of the following criteria: death, postpartum hemorrhage (PPH), was defined as blood loss > 500 mL , postpartum infection (maternal fever > 38°5), emergency surgery in addition to the childbirth procedure*
Results are presented as numbers (percentages), significative p value < 0,05.