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MATERNAL-FETAL MEDICINE

# Prognosis for deliveries in face presentation: a case–control study

**Emmanuelle Arsène[1] · C. Langlois[2] · E. Clouqueur[3] · P. Deruelle[3,4] · D. Subtil[3,5]**

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## Abstract

**Purpose** To estimate the maternal and fetal prognosis for attempted vaginal deliveries of fetuses in face compared with vertex presentations. To evaluate the factors associated with a cesarean during labor for fetuses in face presentation.

**Methods** This case–control study collected all the cases of face presentation in a university hospital level-3 maternity ward between 22 and 42 weeks of gestation over a 16-year period. For each case, we selected three control cases with vertex presentations delivered the same day. Cesareans before labor were excluded.

**Results** We compared 60 attempted vaginal deliveries of fetuses in face presentation with 174 of fetuses in vertex presentation. The cesarean rate during labor was more than three times higher for the face presentations (31.7 vs 9.2%, $P < 0.0001$). Arterial pH values and Apgar scores were similar in both sets of newborns. After logistic regression, the factors associated with a cesarean during labor were nulliparity and early diagnosis of the presentation (i.e., before 5 cm dilatation). The initial position (mentum-anterior vs. transverse or posterior) was not significantly associated with the mode of delivery.

**Conclusions** In face presentations, attempted vaginal delivery triples the cesarean risk. Nonetheless, more than two-thirds of these women give birth vaginally without any impairment of neonatal condition.

**Keywords** Face presentation · Deflexed presentation · Prognosis · Cesarean

## Purpose

Face presentation at delivery is a rare situation in which vaginal delivery is theoretically possible [1]. Its incidence varies from 0.5 to 3 per 1000 births, according to the series [1–6]. This situation is known to be benign ("if a face is making progress, leave it alone" [7]) but its rarity and the risks associated with it make it stressful for obstetricians: edema of the infant's face at birth [1], possibility of dystocia when the chin is posterior to the pelvic outlet [1, 2, 6], and the rare but real risk of eye injury [8].

Studies conducted more than 30 years ago indicated notable neonatal mortality rates, ranging from 3.3 to 7.6%; nonetheless perinatal mortality overall was higher during that period [2, 9, 10]. More recent studies—from 1998 to 2008 in different countries (United Kingdom, United States, France, and Jordan) [11–14]—reported more reassuring neonatal morbidity figures, but only one of them compared groups with face and vertex presentations [12], although that is the only way to have a specific idea of the prognosis for this rare situation. It showed no increase in neonatal risk [12].

Several authors have also reported that face presentation is associated with an increased risk of cesarean delivery [3, 10, 12, 15]. This increase has mainly been attributed to mentum-posterior positions [3, 10, 15], but other factors have been mentioned, including nulliparity and high birth weight. Recently, Shaffer et al. also implicated the use of epidural analgesia and the failure to use oxytocin [12].

We conducted a study with a twofold objective: first, to assess the prognosis for vaginal delivery in face compared with vertex presentations; second, to determine the

✉ Emmanuelle Arsène
emmanuelle.arsene@hotmail.fr

1 Pôle Femme Mère Enfant, Centre Hospitalier de Calais, Boulevard des Justes, 62100 Calais, France

2 Unité de Biostatistiques, MRRC, CHRU Lille, 6, rue du Professeur Laguesse, 59045 Lille cedex, France

3 Pôle Femme Mère Nouveau-né, Clinique d'Obstétrique, Hôpital Jeanne de Flandre, Université Nord de France, 59037 Lille cedex, France

4 EA 4489, Environnement périnatal et croissance, PRES Université Lille Nord de France, 59000 Lille, France

5 EA 2694, PRES Université Lille Nord de France, 59000 Lille, France

factors associated with a cesarean during labor in this type of presentation.

## Methods

This retrospective case–control study reviewed records of women admitted to our level-3 university hospital maternity ward from March 22, 1996 (the date it opened), and January 1, 2013. After approval by a national ethics committee (CEROG OBS 2014-06-03), we identified both case and control women from the computerized data base of deliveries (begun on opening day) and then examined their complete records. All patients were individually informed of the use of their medical data and the possibility of opposing the use of these data. The case patients were women who gave birth to a child in face presentation at a gestational age of 22–42 weeks; we excluded women with in utero fetal deaths and medically indicated terminations of pregnancy. In twin pregnancies, only the twin in face presentation, whether the first or second twin, was included in the case group. For each case, we identified three control patients based on the date and hour of her delivery (two women before the index case and one after). Medical terminations of pregnancy and in utero deaths were also excluded from the control population, as were all presentations except vertex. Cesareans before labor were secondarily excluded from each group.

For each case and each control, we retrospectively collected the following maternal and fetal data from their prospectively recorded case records: maternal age and weight, parity, onset and duration of labor, use of local or regional analgesia, use of oxytocin, mode of delivery, postpartum hemorrhage, high-degree perineal lacerations, neonatal arterial pH, 5-min Apgar score (< 7), neonatal fracture at delivery, transfer to the neonatal intensive care unit (NICU), and neonatal death.

The initial analysis compared maternal and infant prognosis according to the type of presentation (face or vertex). Subsequently, we examined the factors associated with cesareans during labor among the deliveries in face presentation, simultaneously exploring maternal factors (age, height, BMI, parity, cesarean history), the course of labor (mode of labor onset, duration, early rupture of membranes, local or regional analgesia, use of oxytocin, early diagnosis of presentation, i.e., before 5 cm dilatation) and fetal factors (gestational age at delivery, birth weight, specific chin position).

In the statistical analysis, qualitative variables are reported as the number of individuals, with percentages between parentheses. The quantitative data are presented as means with their standard deviations. The cases and controls were compared for the qualitative variables with a Chi square test, or, when appropriate, Fisher's exact test. Comparisons for the quantitative variables used the Mann–Whitney test for data without a normal (Gaussian) distribution and Student's t test for those normally distributed. The normality of the distribution of the quantitative variables was tested with the Shapiro–Wilk's test.

Finally, we used logistic regression to search for the factors associated with cesareans during labor for face presentations. All the variables from the univariate analysis with a $P$ value < 20% were selected, and a clinical expert validated the variables included in a forward stepwise logistic regression model. Only the final model is presented, with its odds ratios and their 95% confidence intervals. The Mantel–Haenszel test was used to study the specific associations between some factors and the risk of cesarean delivery.

We used SAS software, version 9.2 (SAS Institute Inc., Cary, NC) to analyze the data. A $P$ value < 0.05 was considered to be statistically significant.

## Results

Of the 77,878 births at or after 22 weeks in our hospital during the study period, 76,197 were live born (Fig. 1): 64 were in face presentation, for an incidence of 0.8 per 1000 births. The control group included three vertex births for each case, that is, 192 women. After exclusion of the prelabor cesareans (similar rates in the face and vertex groups: 6.3 vs 9.4%, respectively, $P = 0.61$), 60 births of face presentations were compared with 174 births of singletons or twins in vertex presentation (this sample included no pregnancies involving three or more fetuses).

Table 1 summarizes the women's characteristics. Among those with a trial of vaginal delivery, women with fetuses in face presentation were on average smaller, multiparous, and expecting twins more often than those with vertex presentations.

Table 2 presents the course of labor and outcome according to type of presentation. The proportions of induced labor, regional analgesia, and oxytocin use were similar in both groups, as was the duration of labor. On the other hand, the rate of cesareans during labor for face presentations reached 31.7%, triple that for vertex presentations. We also observed a higher risk of postpartum hemorrhage among the women with attempted vaginal delivery of a fetus in face presentation. This difference was due exclusively to the cesarean deliveries. There were no high-grade perineal lacerations in either group.

As Table 3 shows, newborns in face presentation were more often preterm and more often had a birth weight less than 2500 grams. Mean gestational age was less than a week in face presentation, but this was not significant. Post-term was similar in both the groups.

**Fig. 1** Flow chart

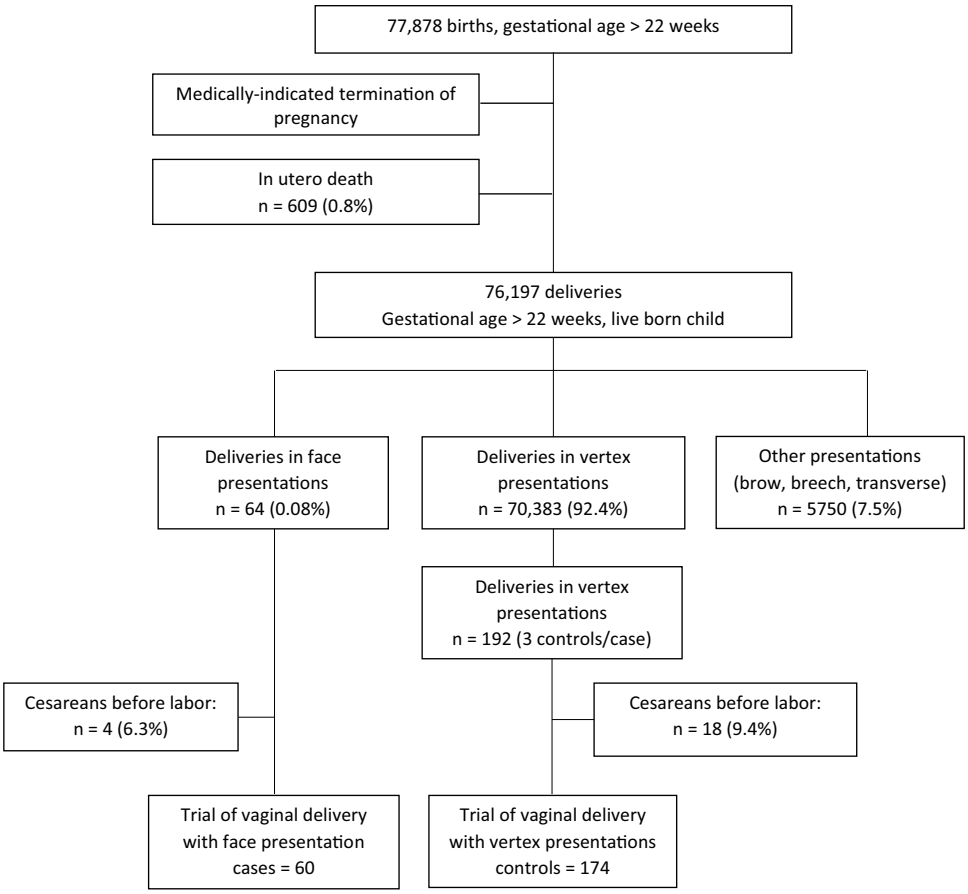


**Table 1** Patient characteristics

| | Face $n=60$ | Vertex $n=174$ | $P$ |
|---|---|---|---|
| Maternal age (years) (mean ± SD) | 29.4 ± 4.9 | 29.1 ± 5.6 | 0.80 |
| Height (cm) (mean ± SD) | 162.6 ± 6.0 | 165.0 ± 6.0 | 0.006 |
| BMI (kg/m$^2$) (mean ± SD) | 22.6 ± 5.4 | 23.1 ± 5.2 | 0.53 |
| Multiparity *n* (%) | 43 (71.7) | 94 (54.0) | 0.02 |
| Twin pregnancy *n* (%) | 10 (16.7) | 3 (1.7) | < 0.0001 |
| Previous cesarean *n* (%) | 7 (11.7) | 18 (10.3) | 0.78 |

*SD* standard deviation

The rates of 5-min Apgar scores < 7, of arterial pH ≤ 7.15, and of arterial pH ≤ 7.0 were identical in the two groups. There was no fetal fracture in either group. The rate of NICU transfer was higher for the infants in face presentation, due entirely, however, to the excess number of preterm births in this group. Finally, the only neonatal death observed in the case group was not due to the presentation but to a malformation (anencephaly in a twin).

The univariate analysis to identify factors associated with a cesarean during labor is reported in Table 4. These were maternal height ≤ 160 cm, nulliparity, early diagnosis of

**Table 2** Course of labor and outcome of delivery according to presentation

| | Face $n=60$ | Vertex $n=174$ | $P$ |
|---|---|---|---|
| Type of labor *n* (%) | | | |
| Spontaneous | 46 (76.7) | 133 (76.4) | 0.97 |
| Induced | 14 (23.3) | 41 (23.6) | |
| Regional analgesia *n* (%) | 48 (80.0) | 152 (87.4) | 0.16 |
| Oxytocin *n* (%) | 34 (58.6)[a] | 106 (60.9) | 0.76 |
| Duration of labor (h) (mean ± SD) | 4.3 ± 2.5[a] | 5.1 ± 2.9 | 0.11 |
| Mode of delivery *n* (%) | | | |
| Vaginal delivery, simple | 37 (61.7) | 117 (67.2) | < 0.0001 |
| Forceps | 4 (6.7) | 27 (15.5) | |
| Vacuum extraction | 0 (0) | 14 (8.0) | |
| Cesarean delivery during labor | 19 (31.7) | 16 (9.2) | |
| Hemorrhage > 500 mL *n* (%) | | | |
| None | 43 (71.7) | 152 (87.4) | 0.0002 |
| After a cesarean | 10 (16.7) | 4 (2.3) | |
| After vaginal delivery | 7 (11.7) | 18 (10.3) | |

[a]Information not recorded for two women

**Table 3** Prognosis according to type of presentation

| | Face $n=60$ | Vertex $n=174$ | $P$ |
|---|---|---|---|
| Gestational age delivery (weeks) (mean ± SD) | 38.0 ± 3.8 | 39.1 ± 2.1 | 0.35 |
| Preterm birth *n* (%) | 15 (25.0) | 13 (7.5) | 0.0003 |
| Post-term birth *n* (%) | 2 (3.3) | 7 (4.0) | 0.81 |
| Birth weight (gram) (mean ± SD) | 2940 ± 920 | 3190 ± 580 | 0.44 |
| < 2500 g *n* (%) | 18 (30.0) | 16 (9.2) | < 0.0001 |
| 5-min Apgar < 7 *n* (%) | 1 (1.7) | 3 (1.7) | > 0.99 |
| Arterial pH (mean ± SD) | 7.25 ± 0.07 | 7.25 ± 0.09 | 0.38 |
| pH ≤ 7.15 *n* (%) | 4 (6.7) | 18 (10.3) | 0.61 |
| pH ≤ 7.00 *n* (%) | 0 (0.0) | 1 (0.6) | > 0.99 |
| Neonatal transfer *n* (%) | | | |
| None | 47 (78.3) | 162 (93.1) | < 0.0001 |
| Child born < 37 weeks' gestation | 13 (21.7) | 7 (4.0) | |
| Child born at term | 0 (0.0) | 5 (2.9) | |
| Neonatal death *n* (%) | 1 (1.7)[a] | 3 (1.7)[b] | > 0.99 |

[a]Anencephaly in one twin

[b]Two cases of left diaphragmatic hernia and one case of preterm delivery at 27 weeks

presentation (before 5 cm dilatation), mentum-transverse or mentum-posterior positions at diagnosis, birth ≥ 37 weeks and a weight ≥ 2500 g. As planned in the protocol, a previous cesarean delivery was added to the logistic regression model ($P \leq 0.20$). After forward stepwise regression, only nulliparity [OR 5.0 (1.1–22.6)] and early diagnosis of face presentation [OR 15.2 (3.3–71.4)] remained significantly associated with a cesarean during labor (discriminant power of the logistic regression = 0.833). The type of chin position at diagnosis was, therefore, no longer significantly associated with cesarean delivery after this regression.

As the mentum-anterior position was closely associated with the early or late nature of the diagnosis of the presentation, we sought to verify the nature of the relation between early diagnosis and cesarean risk, while taking the chin position into account, and inversely (Table 5). The Mantel–Haenszel test confirmed the existence of a statistically significant association between early diagnosis of face presentation and cesarean delivery ($P = 0.009$), without any significant link between the specific chin position and cesarean delivery ($P = 0.167$).

## Discussion

Our study shows a satisfactory neonatal prognosis after attempted vaginal delivery of fetuses in face presentation, despite the tripled cesarean risk. The factors associated with this risk appear to be nulliparity and early diagnosis of the presentation, regardless of the specific chin position (posterior or transverse vs. anterior).

Although more than two-thirds of the women in our series had vaginal deliveries, the prognosis for delivery in face presentation was good, similar to that for infants in vertex presentations. Specifically, umbilical artery pH and Apgar scores were similar in the two groups. In the literature, only a single recent study has compared neonatal prognosis for face and vertex presentations [12]. In this study, the arterial pH also appeared similar, regardless of the presentation. We observed no fetal trauma, in particular, of the face, although we used forceps in 6.7% of the cases. The rate of NICU transfer in our series was higher in the group with face presentations. Nonetheless, these transfers were due exclusively to the higher proportion of preterm births among the infants with face presentation, which is more frequent in both preterm births and low-birth-weight infants [11, 16]. Finally, the only perinatal death observed in the face presentation group was due to a congenital malformation (anencephaly in one twin). On the whole, we thus observe that subsequent obstetric outcome of face presentations has improved over time; the mortality rate has dropped from 11.7% before 1955 to 3.8% between 1955 and 1981 [2] and is now equivalent to that of vertex presentations in our series—1.7% in our series.

In terms of maternal prognosis, we observed no high-grade sphincter lacerations, despite the ample movement required in this presentation to release the occiput once the chin is under the pubic symphysis. In the literature, only the study by Ducarme et al. mentions this aspect of maternal prognosis; they too found no high-grade lacerations in their series of 32 deliveries of face presentations [13]. On the other hand, the cesarean rate in our study was three times higher for the face than the vertex presentations; face presentations were, therefore, at higher risk of postpartum hemorrhage. This high cesarean rate is similar to that observed in three other recent studies, with rates ranging from 37 to 44% [11, 14].

**Table 4** Factors associated with the performance of a cesarean during labor (face presentations only)

| | Cesarean (%) (*n*) | *P* |
|---|---|---|
| Height (cm) | | |
| ≤ 160 | 45.8 (11/24) | 0.05 |
| > 160 | 22.2 (8/36) | |
| Nulliparity | | |
| Yes | 52.9 (9/17) | 0.03 |
| No | 23.3 (10/43) | |
| Previous cesarean | | |
| Yes | 57.1 (4/7) | 0.19 |
| No | 28.3 (15/53) | |
| Regional analgesia | | |
| Yes | 33.3 (16/48) | 0.74 |
| No | 25.0 (3/12) | |
| Oxytocin[a] | | |
| Yes | 26.5 (9/34) | 0.23 |
| No | 41.7 (10/24) | |
| Early diagnosis (≤ 5 cm)[a] | | |
| No | 9.7 (3/31) | < 0.0001 |
| Yes | 59.3 (16/27) | |
| Chin position at diagnosis[b] | | |
| Anterior | 13.2 (5/38) | 0.0004 |
| Transverse or posterior | 57.9 (11/19) | |
| Duration of labor[a] | | |
| ≤ 5 h | 30.0 (12/40) | 0.50 |
| > 5 h | 38.9 (7/18) | |
| Gestational age at delivery | | |
| < 37 weeks | 6.7 (1/15) | 0.02 |
| ≥ 37 weeks | 40 (18/45) | |
| Birth weight | | |
| < 2500 g | 5.6 (1/18) | 0.005 |
| ≥ 2500 g | 42.9 (18/42) | |

[a]Information not reported for two women

[b]Initial position unknown for three women (cesareans)

Among the factors associated with this increased cesarean risk, only nulliparity and early diagnosis of face presentation (before 5 cm of cervical dilatation) remained significantly associated with this mode of delivery after logistic regression. That is, the specific chin position, which is a standard risk factor for cesareans described by numerous authors [3, 10, 15], was not significantly associated with a cesarean after this regression. The proportion of mentum-anterior positions observed in our study (63.3%) corresponds to that in the literature, where they are observed in 51–80% of the cases, while mentum-posterior positions are observed in 20–26%, and mentum-transverse positions in 10–23% [2, 3, 15].

While vaginal delivery is generally accepted for infants in mentum-anterior positions and 73–88% are born vaginally [10, 12, 13], management for mentum-posterior positions is more controversial. Some authors favor a cesarean from the start [15, 17], while others recommend expectant management [3, 6, 12] since spontaneous anterior rotation occurs in around one to two-thirds of women [3, 6]. In our series, 42.1% (8/19) of the mentum-transversal or posterior positions turned to an anterior position and enabled vaginal delivery, with a gestational age at birth at 40.0 ± 1.3 weeks. Other persistent mentum-transversal or posterior positions (57, 9%) required a cesarean section (data not shown).

In our study, cesarean delivery was associated with an early diagnosis of face presentation. When it was diagnosed before 5 cm of dilatation, the cesarean rate was high: 66.7% for mentum-posterior positions, and 40% for mentum-anterior. These data, added to the review of the obstetric records, led us to hypothesize that this increased cesarean rate in cases of early diagnosis might be linked to both cervical dystocia before 5 cm of dilatation and to the inexperience of obstetricians facing this rare and, therefore, worrisome presentation. Accordingly, when a face presentation is diagnosed at entry into the delivery room, obstetricians might greet the occurrence of risk factors such as posterior positions, fetal

**Table 5** Study of the association between early diagnosis and cesarean risk, taking position into account, and the inverse (face presentations only, model calculated from 55 patients)

| | Cesarean risk (%) | *p* | Mantel–Haenszel |
|---|---|---|---|
| For anterior position | | | |
| Early diagnosis (≤ 5 cm) | 40.0 (4/10) | 0.015 | |
| Late diagnosis (> 5 cm) | 3.8 (1/26) | | |
| For posterior or transverse position | | | 0.009 |
| Early diagnosis (≤ 5 cm) | 66.7 (10/15) | 0.26 | |
| Late diagnosis (> 5 cm) | 25.0 (1/4) | | |
| In the case of early diagnosis of position | | | |
| Anterior position | 40.0 (4/10) | 0.24 | |
| Posterior or transverse position | 66.7 (10/15) | | |
| In the case of late diagnosis of position | | | 0.167 |
| Anterior position | 3.8 (1/26) | 0.25 | |
| Posterior or transverse position | 25.0 (1/4) | | |

heart rate abnormalities, or stalled cervical dilatation with less patience than in cases of vertex presentation.

Our study has two principal types of limitations. First, selection bias is always a risk in this type of retrospective study. The control group was matched with hour and date of delivery, to identify the maternal and fetal factors associated with face presentation in a previous study [16]. Concerning the prognosis of delivery in this presentation, it would have been more judicious to pair vertex and faces on gestational age and number of fetuses. Indeed, it seems plausible that premature and twin deliveries (which are both risk factors of face deliveries [16]) more often result in cesarean section or in a NCIU transfer than a term singleton deliveries.

Second, the rarity of face presentation means that our study spans a period of 16 years, which increases the risk of bias linked to temporal variations in obstetrical practices. Nonetheless, both the team members and the cesarean rate—between 15 and 19% during the study period—remained fairly stable during this period. Moreover, our study has a control series, which enabled us to avoid some of the issues related to potential variations in practices over time. This control group is one of the two principal strengths of our study over earlier studies of face presentations. Such a group is essential for objective analysis of the current neonatal and maternal prognosis for face presentations. To our knowledge, it is only the second study to use this methodology [12].

The second advantage is that this is one of the largest series published in recent decades, together of that of Zayed in 2008, which included 79 face presentations [14]. Accordingly, we were able to use multivariate analysis to identify the factors associated with cesareans during labor. The only previous study with this type of analysis was that by Shaffer et al. who suggested that epidural analgesia and oxytocin played a role in the risk of cesarean delivery for face presentations [12]. We examined both of these factors in our study but found no relation between them and a higher cesarean risk.

Finally, our study shows that the prognosis for attempted vaginal delivery of fetuses in face presentation is identical to that for those in vertex presentations, despite the tripled cesarean rate. This increased cesarean rate appears to be linked more to the early diagnosis of this rare presentation, stressful for the obstetrician, than to the type of chin position, which in any case has around a 50% of spontaneously converting to anterior. Expectant management must, therefore, be envisioned if fetal heart rate allows and labor progresses. These data should reassure obstetricians, who face this situation in less than one delivery per thousand.

**Author contributions** EA: project development, data collection, data analysis, and manuscript writing. CL: data analysis. EC: manuscript editing. PD: manuscript editing. DS: project development, data analysis, and manuscript writing/editing.

## Compliance with ethical standards

**Conflict of interest** The authors declare that they have no conflict of interest.

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