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CLINICAL ARTICLE

Transecting versus avoiding incision of the anterior placenta previa during cesarean delivery

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ABSTRACT

Objective: To compare maternal outcomes after transection and after avoiding incision of the anterior placenta previa during cesarean delivery. **Methods:** In a retrospective study, records were reviewed for women who had anterior placenta previa and delivered by cesarean after 24 weeks of pregnancy at a tertiary center in Rouen, France. During period A (January 2000 to December 2006), the protocol was to systematically transect the placenta when it was unavoidable. During period B (January 2007 to December 2010), the technique was to avoid incision by circumventing the placenta and passing a hand around its margin. Logistic regression was used to identify independent risk factors associated with maternal transfusion of packed red blood cells. **Results:** Eighty-four women were included (period A: n = 43; period B: n = 41). During period B, there was a reduction in frequency of intraoperative hemorrhage (> 1000 mL) ($P = 0.02$), intraoperative hemoglobin loss ($P = 0.005$), and frequency of blood transfusion ($P = 0.02$) as compared with period A. In multivariable analysis, period B was associated with a reduced risk of maternal transfusion (odds ratio 0.27; 95% confidence interval 0.09–0.82; $P = 0.02$). **Conclusion:** Avoiding incision of the anterior placenta previa was found to reduce frequency of maternal blood transfusion during or after cesarean delivery.

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1. Introduction

A US population-based study found the overall annual incidence of placenta previa to be 4.8 per 1000 deliveries [1]. The rate of cesarean delivery for women with placenta previa late in the third trimester is high and is inversely correlated with the distance from the placental edge to the internal cervical os at transvaginal sonography [2]. However, cesarean delivery for placenta previa may represent a major risk factor for severe postpartum hemorrhage. A recent study in Norway [3] showed an increased risk of blood loss of greater than 1500 mL for women with planned (odds ratio [OR] 15.3) or emergency (OR 7.9) cesarean delivery for placenta previa. In a large prospective study in the USA [4], the estimated risk of intraoperative or postoperative blood transfusion in women with placenta previa was 15% and 32.2% in primary or repeat cesarean delivery, respectively.

Cesarean delivery among women with anterior placenta previa can lead to substantial maternal and fetal blood loss if the placenta is incised during delivery [5,6]. The best technique for cesarean delivery among women with anterior placenta previa is not well described and might be either quick transection of the placenta or avoiding incision of the placenta altogether [6]. The aim of the present study was to compare

the maternal outcomes after transection of the anterior placenta during cesarean delivery with those after use of a previously described method that avoids transecting the anterior placenta by using iatrogenic partial manual cleavage of the placenta, followed by rupture of the membranes and subsequent delivery of the neonate [7].

2. Materials and methods

In a retrospective study, data were extracted and analyzed for women who had had placenta previa and delivered by cesarean between January 1, 2000, and December 31, 2010, at Rouen University Hospital, Rouen, France. Women with placenta accreta (diagnosed according to clinical and histologic criteria, as previously reported [8]), a posterior placenta, twin pregnancies, or intrauterine fetal death were excluded. Only women with an anterior placenta who delivered at the hospital after 24 weeks of pregnancy were included. The study was approved by the regional Institutional Ethics Committee of Rouen University Hospital. Informed consent was deemed unnecessary because the research concerned only data retrospectively extracted from medical charts.

Gestational age was determined from the first-trimester routine ultrasonography examination. Placenta previa was classified and located according to the results of the last transvaginal examination or transabdominal sonographic examination prior to delivery. It was graded as complete (internal cervical os covered by the placenta), marginal

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(the edge of the placenta at the margin of the internal os), or low lying (the edge of the placenta did not reach the internal os).

Conservative expectant management via the use of tocolytic agents and hospitalization is standard for women with bleeding and/or contractions prior to term. The main indications for cesarean delivery were complete placenta previa, acute massive bleeding, previous cesarean delivery, and fetal distress. Cesarean delivery was usually planned at 37–38 weeks of pregnancy for women in a stable condition (because amniocentesis was not routinely used to test lung maturity in the study department), or earlier if bleeding occurred or the woman went into labor [5].

In the present analysis, data were compared from two periods in which different cesarean protocols were used for women with placenta previa: January 1, 2000, to December 31, 2006 (period A); and January 1, 2007, to December 31, 2010 (period B). During period A, cesarean was usually performed through the lower segment by a transverse or vertical hysterotomy, depending on the fetal position. The placenta was quickly transected below the uterine incision immediately after it was localized when it was unavoidable. During period B, the location of the lower segment incision was decided only after careful ultrasound mapping of the placental site. Ultrasound mapping can help surgeons to determine the direction of the nearest edge of the placenta overlying the uterine incision. As soon as the lower segment incision was made, the neonate was delivered by the obstetrician via an iatrogenic cleavage plane between the uterus and the placenta, thereby avoiding incision of the placenta, as previously described [7]. However, placental transection was sometimes necessary when the placenta covered the whole anterior uterine wall. During the overall study period, classic uterine incision was sometimes necessary in cases of extreme prematurity or premature rupture of the membranes with an insufficiently developed lower segment.

No specific maneuvers to control maternal blood loss were performed on the lower uterus before delivering the neonate during the overall study period [5]. During period B, a regional agreement meant that patients with complete placenta previa or who had had previous cesarean deliveries were transferred to the study center, which provides tertiary care.

Maternal morbidity was assessed by the following indicators: need for blood transfusion (intraoperatively or postoperatively before hospital discharge), intraoperative hemorrhage (>1000 mL), change in hemoglobin count (difference between preoperative hemoglobin count [measured immediately before surgery] and postoperative [measured on the first day after surgery] hemoglobin counts) for patients who did not receive blood transfusion during cesarean delivery, use of prostaglandin agents, use of an additional uterine devascularization procedure or peripartum hysterectomy, postpartum fever higher than 38.5 °C for 24 hours, length of hospitalization, and maternal death. Immediate neonatal morbidity was also assessed via the following indicators: preterm delivery at less than 34 weeks, Apgar score of less than 7 at 5 minutes, immediate resuscitation, neonatal hemoglobin at birth, length of hospitalization, and neonatal death.

The primary outcome of the study was maternal transfusion (intraoperatively or postoperatively before hospital discharge) of packed red blood cells. The anesthesiologist and obstetrician jointly decided whether transfusions were necessary on the basis of the mother's hemodynamic situation, the extent of blood loss, and guidelines published in 1996 [9] and 2002 [10]. The transfusion policy did not change between the two periods of study.

Statistical analysis was performed via Stata version 9.0 (Stata Corp, College Station, TX, USA). Maternal characteristics and outcomes were compared between the two periods of study by using univariate analysis. Comparison of continuous variables was performed via Student *t* test. Qualitative variables were compared by χ^2 tests and Fisher exact tests, as appropriate. $P < 0.05$ was considered statistically significant. The relationship of each variable with maternal transfusion was estimated by univariate analysis. Variables with a *P* value of less

than 0.05 were included in regression models to assess independent associations with the primary outcome.

3. Results

During the whole study period, there were 30 452 deliveries, among which 148 (0.5%) women had placenta previa and delivered by cesarean. Fourteen women with placenta accreta, four with twin pregnancies, two with intrauterine fetal death, and 44 with a posterior placenta were excluded from the study sample. Overall, 84 women with an anterior placenta who delivered by cesarean were included in the study (period A: *n* = 43; period B: *n* = 41).

The demographic and clinical characteristics of the study population are shown in Table 1. Placenta previa was complete in 50 (59.5%) women, marginal in 13 (15.5%), and low lying in 21 (25.0%). The uterine incisions were low transverse in 60 (71.4%) women, low vertical in 6 (7.1%), and classic in 18 (21.4%).

The incidence of prior cesarean delivery and gestational age at delivery were significantly higher in period B than during period A ($P = 0.03$ for both) (Table 1). Placental transection was more frequently performed during period A than during period B ($P = 0.001$). The placenta was low lying in 12 (27.9%) women in period A and 9 (22.0%) in period B ($P = 0.79$). Additionally, the frequency of classic uterine incision was similar in both periods: it was used in 10 (23.3%) women in period A and 8 (19.5%) in period B ($P = 0.71$).

Maternal and neonatal morbidity between the two periods are compared in Table 2. Overall, 24 (28.6%) women received transfusion; the mean number of packs of red blood cells used was 4.2 ± 2.2 . Fewer women received a transfusion in period B than in period A ($P = 0.02$). However, the number of packs of packed red cells used was similar between period A (4.1 ± 1.8) and period B (4.4 ± 3.2 ; $P = 0.76$). Maternal transfer to the intensive care unit was indicated in two cases of severe hemorrhage that required a devascularization procedure in period A. There were fewer cases of intraoperative hemorrhage in period B than in period A, and fewer women required prostaglandin for hemorrhage or blood transfusion in period B (Table 2). Change in hemoglobin count was also lower during period B (Table 2).

For neonates, frequency of immediate resuscitation and duration of hospitalization were significantly reduced during period B, but hemoglobin levels at birth were significantly higher (Table 2). There

Table 1
Demographic and clinical characteristics.^a

Characteristic	Overall (<i>n</i> = 84)	Period A (<i>n</i> = 43)	Period B (<i>n</i> = 41)	<i>P</i> value
Maternal age, y	32.1 ± 5.1	31.9 ± 5.5	33.1 ± 4.4	0.06
BMI	23.3 ± 4.8	23.6 ± 5.4	23.1 ± 4.1	0.65
Parity	2.6 ± 1.6	2.3 ± 1.5	2.9 ± 1.7	0.09
Prior abortion with curettage	35 (41.7)	18 (41.9)	17 (41.5)	0.97
Prior cesarean delivery	24 (28.6)	8 (18.6)	16 (39.0)	0.03
Smoker during pregnancy	27 (32.1)	12 (27.9)	15 (36.6)	0.39
Tocolytic therapy during pregnancy	50 (59.5)	27 (62.8)	23 (56.1)	0.53
Prepartum transfusion	4 (4.8)	1 (2.3)	3 (7.3)	0.28
Complete placenta previa	50 (59.5)	25 (58.1)	25 (61.0)	0.79
Transfer from another hospital	46 (54.8)	20 (46.5)	26 (63.4)	0.28
Emergency cesarean due to hemorrhage	48 (57.1)	26 (60.5)	22 (53.7)	0.52
Preoperative hemoglobin, g/L	112 ± 8	112 ± 9	112 ± 8	0.94
Regional anesthesia	24 (28.6)	9 (20.9)	15 (36.6)	0.11
Low transverse hysterotomy	60 (71.4)	31 (72.1)	29 (70.7)	0.89
Placental transection	42 (50.0)	29 (67.4)	13 (31.7)	0.001
Gestational age at delivery, wk	35.1 ± 3.8	34.1 ± 4.1	35.9 ± 3.4	0.03
Birth weight, g	2488 ± 815	2383 ± 783	2599 ± 842	0.22

Abbreviation: BMI, body mass index (calculated as weight in kilograms divided by the square of height in meters).

^a Values are given as mean ± SD or number (percentage), unless stated otherwise.

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