OBSTETRICS

Risk factors for unscheduled delivery in patients with placenta accreta

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OBJECTIVE: Patients with suspected placenta accreta have improved outcomes with scheduled delivery. Our objective was to identify risk factors for unscheduled delivery in patients with suspected placenta accreta.

STUDY DESIGN: This was a cohort study of women with antenatally suspected placenta accreta. Women who delivered prior to a planned delivery date were compared with women who had a scheduled delivery. Data were analyzed using a Student *t* test, χ^2, logistic regression, and survival analyses. Variables included in the analyses were episodes of antenatal vaginal bleeding, preterm premature rupture of membranes (PPROM), uterine contractions, prior cesarean deliveries, interpregnancy interval, parity, and patient demographic factors. A value of $P < .05$ was considered significant.

RESULTS: Seventy-seven women with antenatal suspicion for placenta accreta were identified. Thirty-eight (49.4%) had an unscheduled delivery. Demographics were similar between groups. Unscheduled patients delivered earlier (mean 32.3 vs 35.7 weeks, $P < .001$) and were significantly more likely to have had vaginal bleeding (86.8% vs 35.9%, $P < .001$) and uterine activity (47.4% vs 2.6%, $P < .001$). Each episode of antenatal vaginal bleeding was associated with an increased risk of unscheduled delivery (adjusted odds ratio, 3.8; 95% confidence interval, 1.8—7.8). Risk of earlier delivery was even greater when associated with PPROM ($P < .001$).

CONCLUSION: Among women with suspected placenta accreta, those with antenatal vaginal bleeding were more likely to require unscheduled delivery. This risk increases further in the setting of PPROM and/or uterine contractions. These clinical factors should be considered when determining the optimal delivery gestational age for women with placental accreta.

Key words: placenta accreta, risk factors, unscheduled delivery, vaginal bleeding

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Placenta accreta is defined by the abnormal adherence of placental villi to underlying myometrium with an absence of decidua basalis. The greatest risk factor for placenta accreta is an increasing number of prior cesarean deliveries, particularly in the presence of a placenta previa.[1] The incidence of placenta accreta has increased dramatically in recent years with an estimated 1 in 533 pregnancies affected by the condition in the United States.[2] This increased incidence is likely a direct result of an increase in cesarean delivery rates over the last 4 decades.[1,3-5]

Undiagnosed placenta accreta can lead to profuse, life-threatening hemorrhage at the time of attempted placental separation. Even if placenta accreta is suspected, postpartum complications include the need for massive transfusion, cystotomy (intentional or unintentional), ureteral damage, bowel injury, infection, and venous thromboembolism.[1,6,7] Antenatal diagnosis is an important component in the management of accreta because a planned, scheduled delivery with a multidisciplinary team has been shown to decrease the hemorrhagic morbidity when compared with an unscheduled, emergent delivery.[6,7]

Some experts recommend a scheduled, late preterm delivery at a 34 weeks' gestational age,[8] whereas others advise delaying delivery to 36 weeks as a balance between the maternal risks and fetal immaturity.[9] The optimal timing of delivery in patients has not been established, nor have the specific risk factors for predicting an early, unscheduled delivery. Thus, our purpose was to identify risk factors for unscheduled delivery in patients with antenatal suspicion for placenta accreta.

Materials and Methods

This was a retrospective cohort study. Patients with an antenatal suspicion of placenta accreta who delivered at a predetermined gestational age (scheduled delivery) were compared with those who underwent an unscheduled delivery for any indication. Unscheduled patients included both those with an emergent delivery as well as those for which time was allowed to assemble a multidisciplinary team. All deliveries occurred at the University of Utah from January 2000 through May 2013.

Patient data were collected by abstraction of medical records by physician

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investigators. Women were considered to have antenatal suspicion of accreta if there were documented ultrasound findings concerning for accreta[10,11] or if there was documented clinical suspicion based on patient history (eg, the presence of placenta previa with a history of multiple prior cesarean deliveries). Ultrasound findings suspicious for placenta accreta included the presence of vascular placental lakes (particularly along the lower uterine segment and uterovesical interface), loss of retroplacental clear space, or other evidence of direct placental invasion.[10,12] Magnetic resonance imaging was performed at the providers' discretion.

Women were included for analysis only if the placenta accreta was confirmed clinically at the time of delivery or by subsequent histopathology. Placenta accreta was defined clinically by partial or total adherence of the placenta at the time of cesarean delivery[9] or by evidence of direct attachment of placental villi to the underlying myometrium with absence of the decidua basalis on histopathology. Women were excluded if they delivered prior to 23 weeks' gestational age (eg, termination of pregnancy in the second trimester) or if the placenta accreta was suspected or diagnosed only after attempted delivery of the placenta, precluding a scheduled delivery.

To assess risk factors for an unscheduled delivery, data regarding maternal demographic and obstetric characteristics, antenatal ultrasound findings, other antenatal complications (ie, preterm premature rupture of membranes [PPROM]), uterine contractions, vaginal bleeding, and gestational age at delivery were collected. The presence of uterine contractions was determined by documentation of patient-reported contractions at any time during the pregnancy or documentation of contractions by tocometry. Most providers at our institution plan to deliver patients with suspected placenta accreta by 36 weeks' gestation. Thus, episodes of vaginal bleeding were included only if they occurred before that time.

Continuous variables were analyzed with either the Student t test or 1-way analysis of variance for comparison of multiple variables. The Bonferroni correction for multiple comparisons was made. Categorical variables were analyzed with χ^2 or Fisher exact tests where appropriate. For multivariate analyses, all variables of interest were included in a logistic regression model. Covariates were then removed in a stepwise fashion until all covariates in the final model had a value of $P < .2$. Kaplan-Meier statistics were used to create survival curves and their significance determined by the log-rank test. A value of $P < .05$ was considered statistically significant. All statistical analyses were performed using Stata version 12.1 (StataCorp, College Station, TX). The institutional review board of the University of Utah approved this study.

RESULTS

Ninety-one women with placenta accreta were identified between January 2000 and May 2013. Thirteen women (14.3%) were excluded because of a lack of documentation of antenatal clinical suspicion by either clinical history or imaging findings. The mean gestational age of delivery among women without antenatal suspicion for accreta was 33.4 weeks. Four of these patients had PPROM, 3 of whom developed chorioamnionitis as an indication for immediate delivery. One patient delivered at 36 weeks because of a known placenta previa before an abnormally attached placenta was diagnosed at the time of delivery. The remainder (8 patients) had either scheduled or indicated deliveries for labor or fetal indications at or near term. One patient (1.1%) was excluded for delivery prior to 23 weeks' gestation. In that case, the patient experienced both very early PPROM and vaginal bleeding and ultimately elected for gravid hysterectomy at 17 weeks' gestation with accreta confirmed on histopathology.

Thus, the final cohort included 77 women with antenatally suspected placenta accreta and subsequent clinical or pathological confirmation. Thirty-nine (50.7%) had a scheduled delivery at a predetermined gestational age, whereas 38 (49.4%) had an unscheduled delivery. Vaginal bleeding (63.2%) and labor (23.7%) accounted for the majority of the indications for an unscheduled delivery. The remaining unscheduled deliveries were due to suspected chorioamnionitis in the setting of PPROM (5.3%), preeclampsia (2.6%), or other indications (5.3%). Women who did and did not undergo scheduled delivery were similar with regard to maternal age at delivery, race, tobacco use, parity, number of prior cesarean deliveries, and interval since last delivery (Table 1).

As expected, unscheduled patients delivered earlier than those with a scheduled delivery (Figure 1). The mean gestational age for an unscheduled delivery was 32.3 weeks (range, 24.3−37.9 weeks, interquartile range, 31.0−35.1 weeks) compared with 35.7 weeks (range, 33.0−39.3 weeks, interquartile range, 34.9−36.4 weeks) for scheduled delivery ($P < .001$). The delivery gestational age of nearly 36 weeks among those with scheduled delivery is consistent with our institutional practice to deliver women with a high suspicion for placenta accreta close to 36 weeks in the absence of other complications.

In univariate analysis, the number of episodes of antenatal vaginal bleeding was significantly associated with an unscheduled delivery ($P < .001$). Women with a scheduled delivery had a mean of 0.5 episodes of antenatal bleeding compared with 1.8 episodes for those with an unscheduled delivery. PPROM also was associated with an unscheduled delivery; 9 women in this cohort experienced PPROM, and 7 of these (78%) had an unscheduled delivery ($P = .023$).

A logistic regression model was created to determine clinical factors associated with unscheduled delivery. The initial model included the following variables: PPROM, number of episodes of antenatal bleeding, presence of antepartum contractions, number of prior cesarean deliveries, interpregnancy interval, and race/ethnicity. Also, interaction terms were generated for PPROM and vaginal bleeding and PPROM and contractions. In this initial model, only vaginal bleeding ($P = .003$) and antepartum contractions ($P = .001$) were significantly associated with unscheduled delivery ($P < .001$). Covariates were