Pregnancy outcomes in patients with placenta previa on a cesarean scar

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Abstract

OBJECTIVE: We aimed to examine the clinical features and pregnancy outcomes in patients with placenta previa on a cesarean scar.

METHODS: A retrospective review of women who were diagnosed with placenta previa on a cesarean scar in the First Bethune Hospital of Jilin University between December 2011 and December 2017 was performed. Basic patient characteristics and pregnancy outcomes data were collected. Characteristics that are associated with maternal morbidities (post-partum hemorrhage $\geq$ 2000 ml and nits transfused >4) and adverse neonatal outcomes (5-minute Apgar <7 and Low-birth-weight infant) were evaluated.

RESULT ¶ A total of 183 patients was identified. PAS disorders were observed in 63 cases(34.4%).The median postpartum hemorrhage was 700 ml (range,100-7900).70 patients (38.2%) had a blood loss $\geq$ 2000 mL.43 subjects(23.4%) required >4 units of blood. The median 1-minute Apgar score and 5-minute Apgar score was 9 and 9.2 respectively. Additionally ¶ median neonatal birth weight was 1880g (range, 700-4260). Patients with comorbid PAS disorders are more likely subject to post-partum hemorrhage and require units transfused (>4) ($p < 0.05$). Similarly, patients with major placenta praevia had a higher incidence of post-partum hemorrhage and units transfused (>4) than patients with minor placenta praevia ($p < 0.05$). Patients who undertook emergency cesarean due to hemorrhage were more likely to have a low-birth-weight infant than women who undertook planned cesarean.

CONCLUSION: PPP is associated with considerable maternal and fetal morbidity, particularly in patients with comorbid PAS disorders. Delayed delivery may be warranted for those without meaningful vaginal bleeding and preterm labor but need further prospective clinical trials to confirm.

Introduction

The concept of "pernicious placenta previa (PPP)" was first introduced by Chattopadhyay et al[1], which was defined as placenta previa on a cesarean scar with or without accreta. Patients associated with placenta previa on a cesarean scar are supposed to have higher risks of maternal and infant morbidity and mortality than simple placenta previa. Parallel with the dramatic and persistent rise in caesarean delivery rates, the incidence of PPP is increasing[2]. The management of PPP is complicated and challenging for [obstetrician](#) as a result of the increased risk of haemorrhage, visceral organ damage, caesarean hysterectomy and preterm delivery. Approaches including an experienced surgical team lead by a senior obstetrician who are capable of major surgery, prior activation of the support services and intensive care team have been proposed. Previous studies have mainly focused on those that are complicated by simple placenta previa and adherent placenta. However, few data are available to counsel women who are diagnosed with PPP. Improved knowledge of PPP will allow us to offer appropriate management and effectively decrease this morbidity.

Thus, our objectives were to characterize the clinical features associated with placenta previa on a cesarean scar and to define maternal and obstetric risk factors that increase the odds of adverse

pregnancy outcomes.

Method

The present retrospective study examined records from women who had been admitted to the First Bethune Hospital of Jilin University between December 2011 and December 2017. We identified all the patients with a diagnosis of with placenta previa on a cesarean scar from these. Patients who had PPP, but had delivered in another hospital were excluded from the analysis. This study was approved by the Institutional Review Board..

Basic patient characteristics and pregnancy outcomes of all the patients were obtained. The obstetrics information examined were maternal age at delivery, gravidity, the number of previous cesarean deliveries, pregnancy duration at delivery, time since last cesarean delivery. After referral to our hospital, all patients underwent ultrasound examination to confirm the diagnosis. For the purpose of study, placenta previa type was divided by two groups with "major placenta praevia" (complete or partial placenta praevia) or "minor placenta praevia" (marginal placenta praevia or low-lying placenta) and evaluated. Planned cesarean was prepared with packed red blood cells, a major abdominal gynecologic instrument in the operating room and available to intensive care unit. Whereas emergency cesarean was performed as a result of unexpected [haemorrhage](#) without the condition mentioned above. The term PAS disorders are applied to abnormal adherence of the placental trophoblast to the uterine myometrium; including placenta accreta (attachment of the placenta to myometrium without intervening decidua), placenta increta (invasion of the trophoblast into the myometrium), and placenta percreta (invasion through the myometrium, serosa, and into surrounding structures). The PAS disorders diagnosed in this study was confirmed either by histopathological diagnosis of placental invasion into the myometrium, clinical assessment of abnormal adherence of the placenta, or evidence of gross placental invasion at the time of cesarean delivery.

Maternal outcomes were post-partum hemorrhage and units transfused (>4). Post-partum hemorrhage was defined as estimated blood loss ≥ 2000 ml. The estimated blood loss was estimated and documented at the time of the surgical procedure. The number of units of packed red blood cells that each patient received was documented during the perioperative periods. Neonatal outcomes include 5-minute Apgar (<7) and Low-birth-weight infant (birth weight less than 2,500 g).

Descriptive characteristics were calculated for the

variables of interest. Data analyzed using descriptive statistics were presented as means and standard deviations, median with ranges or absolute numbers and percentage, where appropriate. Multivariate logistic regression was developed to investigate the effect of several variables on the pregnancy outcomes. A probability value of <0.05 was considered statistically significant. Results are presented as odds ratios with 95% confidence intervals (95% CI) and p values. All analyses were performed with the software SPSS Statistics 20.0 (IBM Corporation).

Result

A total of 198 patients confirmed of placenta previa on a cesarean scar were identified. Of these, 15 patients had delivered in another hospital were excluded from the analysis. The demographic and obstetric characteristics are presented in table 1. The mean age for the cohort was 32.5 years old. The gestational age among <34weeks, 34–37weeks, and >37weeks are 35 cases(19.1%), 81 cases(44.3%) and 67 cases(36.6%) respectively. Among the 183 cases, 83(45.5%) were minor placenta praevia and 100(54.5%) were major placenta praevia; Furthermore, 116 women (63.4%) had an emergency cesarean due to hemorrhage compared with 67 women (36.6%) who had a planned cesarean. Pathologic and clinical examination of placenta and uterus revealed PAS disorders in 63 cases (34.4%).

Table 2 displays the pregnancy outcomes of the cohort. The median postpartum hemorrhage was 700 ml (range, 100–7900). 70 patients (38.2%) had a blood loss ≥ 2000 mL. 43 subjects (23.4%) required >4 units of blood. The mean preoperative and postoperative hemoglobin level was 108.6g/L and 97.7g/L. The median preoperative and postoperative length of stay was 4 days and 5days. The median 1-minute Apgar score and 5-minute Apgar score was 9 and 9.2. Additionally, median neonatal birth weight was 1880g (range, 700–4260). Hysterectomy was performed in 2.7% as a consequence of uncontrollable bleeding. The median operative time was 104 minutes (range, 40 - 339) for all cases. Bladder injury occurred in 3% of cases. Ureteral stent was placed in 18% of patients.

An analysis of factors that were associated with postpartum hemorrhage and units transfused (>4) is given in the Table3. There was no association among maternal age, gestational age, gravidity, number of previous cesarean deliveries, time since last cesarean delivery or mode of delivery and postpartum hemorrhage ($P > 0.05$ for all). Women with a diagnosis of PAS disorders were more likely to experience postpartum hemorrhage. Among women with a diagnosis of PAS disorders, 25.1% had postpartum hemorrhage compared with 13.1% of those women who were not diagnosed ($p < 0.01$, OR 6.52, 95%CI 2.93–14.51). Moreover, placenta previa type contributed to postpartum hemorrhage. Postpartum hemorrhage was seen in 29.5% of patients with major placenta praevia compared with 8.7% of patients with minor placenta praevia ($p < 0.05$, OR 2.73, 95% CI 1.23–6.05). We found similar results when we examined factors that were associated with units transfused (>4). There was no association among maternal age, gestational age, gravidity, number of previous cesarean deliveries, time since last cesarean delivery or mode of delivery and units transfused (>4).

Patients with PAS disorders are more likely to require units transfused (>4) (18.0% vs 5.5%; $p < 0.05$, OR 8.56, 95% CI 3.64–20.13). Likewise, we also noted that patients with major placenta praevia had a higher incidence of units transfused (>4) than patients with minor placenta praevia. (19.7% vs 3.8%; $P < 0.05$, OR 8.56, 95% CI 3.64–20.13).

Risk factors for 5-minute Apgar score(<7) and Low-birth-weight infant in patients with placenta previa on a cesarean scar are shown in table 4. There was no association among maternal age, gestational age, gravidity, number of previous cesarean deliveries, time since last cesarean delivery, PAS disorders,

placenta previa type or mode of delivery and 5-minute Apgar score(<7)($P > 0.05$ for all). Similar trends were noted when we examined factors that were associated with

low-birth-weight infant. There was no association among maternal age, gestational age, gravidity, number of previous cesarean deliveries, time since last cesarean delivery or PAS disorders and low-birth-weight infant. Women who undertook emergency cesarean due to hemorrhage were more likely to have a low-birth-weight infant than women who undertook planned cesarean. (23.0% vs 5.0%; $P < 0.01$, OR 3.35, 95%CI 1.48–7.55).

Discussion

Our study demonstrated that placenta previa on a cesarean scar termed as PPP is an extremely dangerous condition associated with pregnancy. Patients with PPP were associated with increased risks of maternal morbidity and adverse neonatal outcomes.

Overall, the incidence of postpartum hemorrhage in our cohort is 38.3% and 23.5% of patients required blood transfusions >4 units. It is well established that women with PAS disorders are highly related to massive blood loss, which may cause serious complications such as multisystem organ failure, disseminated intravascular coagulation, caesarean hysterectomy, preterm delivery, and even death[3]. In a large retrospective cohort study[4] including all hospital deliveries in Canada (excluding Quebec) for the years 2009 and 2010 found that approximately 50% of the patients with placenta accreta experienced postpartum hemorrhage more than 500ml, and 22.6% experienced a severe form of postpartum hemorrhage defined as postpartum hemorrhage with blood transfusion, hysterectomy, or other procedures to control bleeding).

Several risk factors have been evaluated to be contributable to PAS disorders[5]. However, placenta previa and previous cesarean delivery are the most acknowledged reasons for PAS disorders. A national case-control study in the UK conducted by Kathryn E. Fitzpatrick et al[6] demonstrated that PAS disorders occurred in more than 5% of women with both a previous caesarean delivery and placenta praevia, whereas the estimated incidence of PAS disorders was only 0.017% in all population; In a large prospective observational cohort study, Robert M. Silver et al[7] found that the risk of placenta accrete which is a form of PAS disorders increased with higher numbers of prior cesarean deliveries in woman with placenta previa, the risk of accreta was 3%, 11%, 40%, 61%, and 67% for first, second, third, fourth, and fifth or more cesareans, respectively. Our research is consistent with the previous analyses. Though PAS disorders are not included in the diagnosis of PPP, it is striking that PAS disorders occurred in more than half (63%) of patients in our cohort. Not surprisingly, women with PAS disorders are more likely to experience postpartum hemorrhage in our cohort. However, using the same criteria, it is noteworthy that the incidence of postpartum hemorrhage in this study without PAS disorders is still 13.1% and nearly two-fold higher, compared with the incidence of postpartum hemorrhage in patients with simple placenta pravia, which were reported to be 7.1% by Martina Kollmann et.al[8].

The best treatment strategy for PAS disorders remains a matter of debate. Most studies[9,10] showed improved outcomes with planned cesarean hysterectomy before the 35th gestational week. However, hysterectomy is extremely unpopular in China and most patients strongly wish to preserve uterus at any cost. Numerous studies[11,12] showed that conservative approach (with or without partial resection of placenta) was a uterus-preserving option for patient with PAS disorders. Nevertheless, PAS disorders managed with the placenta left in situ require close follow-up monitor and it takes at least several months after delivery before placental resorption was achieved[13]. Moreover, maternal morbidity and mortality is not rare in the placenta left in situ approach[14]. In our study, all the cases were performed cesarean section with the removal of placenta at the same time initially. When a catastrophic bleeding occurred which is judged by the obstetric clinicians, subsequent hysterectomy was undertaken immediately. In contrast with the reported uterine preservation rate ranged from 78% to 87%. Uterine preservation rate was 97.3% in our cohort. The maternal morbidity is also unremarkable. Bladder invasion were encountered in 4 patients, and reconstruction of the bladder was performed successfully. No death case was reported. This finding suggests that extirpative management could be an option for patients with PPP who have an excessive desire for future fertility.

Given the possibility of massive blood loss, emergency cesarean was performed directly if preterm labor and vaginal bleeding occurred. Preterm delivery complicated 63.4% of patients in our cohort due to antepartum bleeding. Contrary to previous studies[15], there was no association between emergent delivery and postpartum hemorrhage or large volume transfusion in our cohort. Since an early delivery may expose a neonate to prematurity complications. Delivery may reasonably be delayed in asymptomatic patients with PPP to improve neonatal outcomes. However, it must be recognized that all of the patients in the present study were treated at a tertiary center with intensive support services and the management which may not be applied to smaller facilities that lack these services.

We recognize several limitations in our study. The first is its retrospective design and limited cases included were from a single institution. The selection bias was not likely avoided. However, given the infrequency of PPP, a prospective study consisting large number of subjects is difficult to perform and take several years. To our knowledge, few studies[16] have concentrated on patients with PPP in the literature, our study is helpful to the understanding of characteristic of this condition. Second, the post-operation following up is incomplete and not long enough. Thus, the complications associated with PPP and surgery were probably underestimated. Moreover, length of the observation period was unlikely to evaluate the future fertility. Third, all the subjects were managed in our hospital which is a tertiary care center. massive blood transfusions, anaesthesia and subspecialists in neonatology, urology, vascular surgery, and gynecological oncology were readily available. Accordingly, results may not be generalizable to smaller rural hospitals, and our data likely underestimate the actual risk in smaller hospitals without special services. Finally, we lacked data on some important variables, including BMI, prior uterine surgery history, smoking during pregnancy, medical and obstetric risks such hypertension, diabetes. It is possible that these variables may influence the pregnancy outcomes in PPP and need further evaluation.

In conclusion, PPP is associated with considerable maternal and fetal morbidity, particularly in patients with comorbid PAS disorders. Delayed delivery may be warranted for those without meaningful vaginal bleeding and preterm labor but need further prospective clinical trials to confirm.

Declarations

Author contributions YY: project development, data collection and manuscript writing; ZG: project development and data analysis; YS: data collection and analysis; HX: data collection; MP: data collection; YY: project development and manuscript revision.

Compliance with ethical standards

Conflict of interest All authors declare that they have no conflict of interests.

Ethical approval This study was approved ethically by the First Bethune Hospital of Jilin University, (Jilin, China), and written informed consent was obtained from each participant

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Tables

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