Previous Uterine Operation and Placenta Previa

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Objective: *The primary objective was to examine the association between previous uterine operation and placenta previa. The secondary objectives were to study the association between cesarean hysterectomy and placenta previa and to evaluate the maternal and neonatal outcomes of placenta previa*

Material and Method: *All medical records of placenta previa patients delivered at King Chulalongkorn Memorial Hospital between January 2006 and December 2008 were reviewed (215 records). Two hundred and six records were enrolled and nine records were excluded. Controls were selected by matching the first following patients delivered by cesarean section and none had a previa at delivery the same day as the index case. Student t-test, Mann-Whitney U-test and Chi-square test were used when appropriate. Odd ratio was calculated for evaluation of risk factors of placenta previa.*

Results: *Previous uterine operations were found in the placenta previa group more than the control group but with no statistically significant difference {previous c/s (18.9% vs. 16.5%, p = 0.6), previous myomectomy (1.5% vs. 0%, p = 0.1) and previous dilatation and curettage (17.5% vs. 11.2%, p = 0.1)}. Odd ratio of previous cesarean section and previous dilatation and curettage for placenta previa was 1.2 (95% CI 0.7 to 1.9) and 1.7 (95% CI 0.9 to 2.9), respectively. In the placenta previa group, there were more statistically significant differences and poorer maternal outcomes than in the control group, including blood loss (1,306.1 ml vs. 528.9 ml, p < 0.001), postpartum hemorrhage (9.2% vs. 0.5%, p < 0.001), cesarean hysterectomy (7.3% vs. 0%, p < 0.001), blood transfusion (27.7% vs. 1%, p < 0.001) and more poorer neonatal outcomes than in the control group, including preterm birth (30.5% vs. 3.9%, p < 0.001), lower birth weight (2,777.9 g vs. 3,186.3 g, p < 0.001), and lower APGAR score at first minute (8.24 vs. 8.66, p = 0.004) and at fifth minute (9.45 vs. 9.73, p = 0.035).*

Conclusion: *In the present study, the majority of patients with placenta previa have no association with previous uterine operation. However, it is potentially life-threatening to the mother and frequently results in high perinatal morbidity.*

Keywords: *Placenta previa, Risk factors, Previous cesarean section, Previous abortion, Previous myomectomy, Previous uterine operation*

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Placenta previa defined as placenta located over or very near the internal os, is one of the leading causes of second and third trimester bleeding. The incidence of placenta previa in the USA between 1998 and 2006 was 0.26%[1] and in King Chulalongkorn Memorial Hospital between 2001 and 2005 was 1.2%[2]. It is an important cause of serious morbidity and mortality to both mother and fetus such as postpartum hemorrhage, cesarean hysterectomy, blood component transfusion, preterm delivery, fetal-growth restriction and abnormal presentation[1].

The most accurate method for diagnosis of placenta previa is ultrasonography, which has an accuracy of 96%. Despite detection with high resolution of ultrasonography, morbidity and mortality still have not been decreased.

Classification of placenta previa[1] depends on the relationship between placenta and internal os, including total placenta previa (the internal cervical os is covered completely by placenta), partial placenta previa (the internal os is partially covered by placenta), marginal placenta previa (the edge of the placenta is at the margin of the internal os) and low-lying placenta (the placenta is implanted in the lower uterine segment such that the placenta edge actually

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does not reach the internal os but is in close proximity to it).

The etiology of placenta previa remains unknown and many studies have reviewed the risk factors of placenta previa[3-6], including previous abortion (previous dilatation and curettage) and previous cesarean section. The prevalence of cesarean section has been steadily rising over the last decade, including in the King Chulalongkorn Memorial Hospital. Detection of the risk factors or associated factors of placenta previa would lead to an appropriate counseling and preparation resulting in an improvement of obstetric and neonatal outcomes.

The primary objective of the present study was to examine the association between previous uterine operation and placenta previa. The secondary objectives were to study the association between cesarean hysterectomy and placenta previa and to evaluate the maternal and neonatal outcomes of placenta previa in King Chulalongkorn Memorial Hospital.

Material and Method

The present case-control study was approved by the ethical committee of King Chulalongkorn Memorial Hospital. The sample size was calculated from $Z\alpha/2\sqrt{2PQ} + Z\beta\sqrt{(P1Q1 + P0Q0)}\,2 / (P_1\text{-}P_0)^2$, $\alpha = 0.05$, $\beta = 0.1$ and used the study of David Chelmow et al for reference. Number of population per group should be at least 63. However, in this study, all medical records of placenta previa patients delivered at the King Chulalongkorn Memorial Hospital between January 2006 and December 2008 (215 cases) were reviewed for improved accuracy. This study did not disturb the patients. The inclusion criteria were singleton pregnancy, placenta previa diagnosed at the time of cesarean section and gestational age of more than 22 weeks of gestation. The medical records with missing information were excluded. Controls were selected by matching the first following patients delivered by cesarean section and none had a previa at delivery the same day as the index case. One control was selected for each case.

Background data including age, prepregnancy weight, number of antenatal care, obstetrics history, previous uterine operation, operative note data (placental site, blood loss and blood transfusion), maternal outcomes (postpartum hemorrhage, cesarean hysterectomy) and neonatal outcomes (preterm birth, birth weight and APGAR score at first and fifth minute) were collected.

Student T-test, Mann-Whitney U test and Chi-square test were used when appropriate. A p-value of < 0.05 was considered to be significant. Odd ratio was calculated for evaluation of risk factors of placenta previa.

Results

During the present study period, a total of 215 medical records of placenta previa were reviewed and nine records were excluded. Therefore, 206 records of placenta previa were enrolled in the present study group and 206 medical records of the control group were selected.

The prevalence of placenta previa in the King Chulalongkorn Memorial Hospital during the present study period (2006-2008) was 1.0%. In the placenta previa group, patients who presented with antepartum hemorrhage was 53.4% and without hemorrhage was 46.6% (Table 1). Table 2 shows placental site of the placenta previa group and the control group. The common placenta sites in both the placenta previa and the control groups were on the posterior wall of the uterus, which were 65.5% and 69.4%, respectively (Table 2).

The demographic data of both groups are shown in Table 3. The patients in the placenta previa group were older than in the control group (33.4 vs. 31.1 yr, $p < 0.001$). There were no statistically significant differences in pre-pregnancy weight (52.8 vs. 53.7 g, $p = 0.3$) and number of antenatal care less than four times (5.3% vs. 3.4%, $p = 0.47$) between the two groups. The placenta previa group had significantly more gravidity and parity than the control group (Table 4).

Table 5 shows previous uterine operations in both groups. Previous uterine operations seem to be found more in the placenta previa group than in the control group without statistically significant difference. Odd ratios of previous cesarean section and previous dilatation and curettage for placenta previa were 1.2 (95% confidence interval (CI) 0.7 to 1.9) and 1.7 (95% CI 0.9 to 2.9), respectively.

Table 1. Frequency of antepartum hemorrhage in the placenta previa group

The placenta previa group	No. (cases)	Percent
Antepartum hemorrhage	110	53.4
No hemorrhage	96	46.6

Table 2. Placental site of the placenta previa group and the control group

	Position (cases)	Type of placenta previa	No. (cases)	Percent
The placenta previa group	Anterior (71)	Totalis	37	17.96
		Partialis	7	3.39
		Marginalis	7	3.39
		Low lying	20	9.71
	Posterior (135)	Totalis	84	40.78
		Partialis	2	0.97
		Marginalis	6	2.91
		Low lying	43	20.87
The control group	Anterior		63	30.58
	Posterior		143	69.42

Table 3. Demographic data of the placenta previa group and the control group

Characteristics	The placenta previa group (total = 206)	The control group (total = 206)	p-value
Age (yr) (mean ± SD)	33.4 ± 4.6	31.1 ± 5.1	<0.001
Prepregnancy weight (kg) (mean ± SD)	52.8 ± 9.4	53.7 ± 9.7	0.3
Number of ANC (< 4 times)	11 (5.34%)	7 (3.39%)	0.47

Table 4. Gravidity and parity of the placenta previa group and the control group

Characteristics	The placenta previa group (cases) (total = 206)	The control group (cases) (total = 206)	p-value
Gravidity			
1	77	113	0.001
2	64	58	
3	44	30	
4	16	5	
5	3	0	
6	2	0	
Parity			
0	107	142	0.004
1	75	51	
2	19	13	
3	4	0	
4	1	0	

Maternal outcomes are shown in Table 6. In the placenta previa group, there was statistically significant difference with poorer maternal outcomes than in the control group, including blood loss (1,306.1 ml vs. 528.9 ml, $p < 0.001$), postpartum hemorrhage (9.2% vs. 0.5%, $p < 0.001$), cesarean hysterectomy (7.3% vs. 0%, $p < 0.001$), and blood transfusion (27.7% vs. 1%, $p < 0.001$).

Neonatal outcomes are shown in Table 7. In the placenta previa group, there were also statistically significant difference with poorer neonatal outcomes than in the control group, including preterm birth (30.5% vs. 3.9%, $p < 0.001$), lower birth weight (2,777.9 g vs. 3,186.3 g, $p < 0.001$), and lower Apgar score at first minute (8.2 vs. 8.7, $p = 0.004$) and at fifth minute (9.5 vs. 9.7, $p = 0.035$).

Discussion

The incidence of placenta previa in the present study was 1.0% (Table 8), which is higher than previously reported in the USA (0.26%)[1]. This may be due to the King Chulalongkorn Memorial Hospital being a tertiary referral and national blood bank center. 53.4% of the presented cases had antepartum hemorrhage and 58.7% were placenta previa totalis.

Although the specific cause of placenta previa is unknown, factors that may affect the site of the placenta's attachment to the uterine wall include: advanced maternal age, multiparity, previous uterine surgery, defective vascularization of the decidue (previous abortion and curettage), multiple pregnancy

Table 5. Previous uterine operation in the placenta previa group and the control group

Characteristics	The placenta previa group (cases) (total = 206)	The control group (cases) (total = 206)	p-value*	Odds ratio	95% confidence interval
Previous c/s					
No	167 (81.1%)	172 (83.5%)	0.6	1.2	0.7 to 1.9
Yes	39 (18.9%)	34 (16.5%)			
Previous myomectomy					
No	203 (98.5%)	206 (100%)	0.1	NA	NA
Yes	3 (1.5%)	0 (0%)			
Previous dilatation and curettage					
No	170 (82.5%)	183 (88.8%)	0.1	1.7	0.9 to 2.9
Yes	36 (17.5%)	23 (11.2%)			

Table 6. Maternal outcomes in the placenta previa group and the control group

	The placenta previa group (cases) (total = 206)	The control group (cases) (total = 206)	p-value*
Blood loss (ml) (mean ± SD)	1,306.1 ± 1,531.9	528.9 ± 215.3	<0.001
Postpartum hemorrhage	19 (9.2%)	1 (0.5%)	<0.001
Cesarean hysterectomy	15 (7.3%)	0 (0%)	<0.001
Blood transfusion	57 (27.7%)	2 (1%)	<0.001
Other postpartum complications	6 (2.9%)	3 (1.5%)	0.5

Table 7. Neonatal outcomes in the placenta previa group and the control group

	The placenta previa group (cases) (total = 206)	The control group (cases) (total = 206)	p-value*
Preterm birth (GA < 37 wk)	71 (30.5%)	8 (3.9%)	<0.001
Birth weight (g) (mean ± SD)	2,777.90 ± 630.2	3,186.30 ± 449.5	<0.001
Apgar scores at 1 min (mean ± SD)	8.24 ± 1.82	8.66 ± 1.03	0.004
Apgar scores at 5 min (mean ± SD)	9.45 ± 1.64	9.73 ± 1.05	0.035

Table 8. Incidence of placenta previa in King Chulalongkorn Memorial Hospital

2006	75/5,696 (1.3%)
2007	77/7,556 (1.0%)
2008	54/6,898 (0.8%)

and smoking[6-9]. The present study found that the placenta previa group had significantly higher age, gravida, and parity than the control group. Previous uterine operation (previous cesarean section and previous dilatation and curettage) seems to be more likely to be associated with placenta previa in subsequent pregnancies, even though it does not reach statistical significance, which differed from previous reports. The reason for this finding may be due to the major indication for cesarean section in the control group was previous cesarean section.

The list of complications that have been mentioned in various reports for placenta previa includes maternal hemorrhage and premature delivery[7,9,10]. In the present study, blood loss, incidence of blood transfusion, postpartum hemorrhage, and cesarean hysterectomy are significantly higher in the placenta previa group. The chances to develop postpartum hemorrhage after cesarean section in the placenta previa group was 18.4 times and cesarean

hysterectomy is seven times more than after cesarean section in the non-placenta previa group. Nevertheless, there was no maternal mortality found in the present study. Regarding to neonatal outcomes, the rate of preterm birth was significantly increased in the placenta previa group and the Apgar scores. Furthermore, the infant birth weight were significantly lower in the placenta previa group when compared to the non-previa group.

The strength of the present study was being a case-controlled study. The limitations of the present study were being a retrospective study and lack of information about placenta accreta in operative notes and pathology to confirm diagnosis. Therefore, further study should be performed.

Conclusion

In our institution, the majority of patients with placenta previa have no association with previous uterine operation and nearly half of them have no history of antepartum hemorrhage at the time of cesarean section. However it is a potentially life-threatening to the mother and frequently results in high perinatal morbidity due to premature delivery.

Potential conflicts of interest

None.

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การทำหัตถการเกี่ยวกับมดลูกในอดีตกับการเกิดภาวะรกเกาะต่ำ

วินียา ศุขนิคม, เยื้อน ตันนิรันดร

วัตถุประสงค์*: เพื่อศึกษาความสัมพันธ์ระหว่างการทำหัตถการเกี่ยวกับมดลูกในอดีตกับการเกิดภาวะรกเกาะต่ำ และศึกษาถึงความสัมพันธ์ระหว่างการตัดมดลูกหลังคลอดกับภาวะรกเกาะต่ำ ภาวะแทรกซ้อนในมารดาและทารกของผู้ที่มีภาวะรกเกาะต่ำ*

วัสดุและวิธีการ*: ศึกษาจากเวชระเบียนของหญิงตั้งตรรภ์ที่มีภาวะรกเกาะต่ำและมาคลอดที่โรงพยาบาลจุฬาลงกรณ์ ระหว่างปี พ.ศ. 2549-2551 จำนวน 215 คน มีจำนวน 9 คน ที่คัดออกจากการศึกษา เหลือจำนวน 206 คน และเวชระเบียนของหญิงตั้งครรภ์และมาคลอดที่โรงพยาบาลจุฬาลงกรณ์โดยไม่มีภาวะรกเกาะต่ำระหว่างปี พ.ศ. 2549-2551 จำนวน 206 คน โดยสุ่มเลือกผู้ป่วยที่ได้รับการผ่าตัดคลอดในวันเดียวกันกับผู้ที่มีภาวะรกเกาะต่ำและนำข้อมูลของทั้ง 2 กลุ่มมาทำการศึกษา*

ผลการศึกษา*: ในกลุ่มที่มีภาวะรกเกาะต่ำพบว่ามีความสัมพันธ์กับการทำหัตถการในอดีตกับมดลูกมากกว่ากลุ่มที่ไม่มีภาวะรกเกาะต่ำไม่ว่าจะเป็น การขูดมดลูก (17.5% vs. 11.2%, p = 0.1) การผ่าตัดทำคลอด (18.9% vs. 16.5%, p = 0.6) และการผ่าตัดเนื้องอกมดลูก (1.5% vs. 0%, p = 0.1) แต่ไม่มีนัยสำคัญทางสถิติ และในกลุ่มที่มีภาวะรกเกาะต่ำพบว่ามีภาวะแทรกซ้อนทั้งในมารดาไม่ว่าจะเป็นการเสียเลือด (1,306.1 มล. vs. 528.9 มล., p < 0.001) ภาวะตกเลือดหลังคลอด (9.2% vs. 0.5%, p < 0.001) การได้รับส่วนประกอบของเลือด (27.7% vs. 1%, p < 0.001) และการตัดมดลูกหลังผ่าตัดคลอด (7.3% vs. 0%, p < 0.001) และในทารกไม่ว่าจะเป็นการคลอดก่อนกำหนด (30.5% vs. 3.9%, p < 0.001) น้ำหนักแรกคลอดต่ำ (2,777.9 กรัม vs. 3,186.3 กรัม p < 0.001) และคะแนน APGAR ต่ำทั้งที่นาทีที่ 1 (8.24 vs. 8.66, p = 0.004) และนาทีที่ 5 (9.45 vs. 9.73, p = 0.035) สูงกว่าในกลุ่มที่ไม่มีภาวะรกเกาะต่ำอย่างมีนัยสำคัญทางสถิติ*

สรุป*: จากการศึกษาพบว่าการทำหัตถการเกี่ยวกับมดลูกในอดีตไม่มีความสัมพันธ์ที่ชัดเจนกับการเกิดภาวะรกเกาะต่ำ อย่างไรก็ตามภาวะรกเกาะต่ำส่งผลให้เกิดภาวะแทรกซ้อนทั้งในมารดาและทารกได้*