Risk Factors for Cesarean Hysterectomy in Cesarean Delivery

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Objective: To identify the risk factors for cesarean hysterectomy.

Material and Method: A case-control study was conducted by reviewing the medical records of pregnant women delivered in King Chulalongkorn Memorial Hospital between January 1994 and December 2004. Cases included pregnant women who underwent hysterectomy immediately or within 24 hours after cesarean delivery, whereas control referred to pregnant women who underwent cesarean section at the same period.

Results: Of the 109,005 deliveries, twenty-seven women (0.25/1000-delivery) underwent cesarean hysterectomy. With multivariate analysis, the risk factors significantly associated with peripartum hysterectomy were placenta previa (adjusted OR = 67.96, 95%CI = 15.32, 301.46) and multiparity (adjusted OR = 7.30, 95%CI = 1.24, 43.19). When compared to controls, cases with cesarean hysterectomy had higher incidence of maternal and neonatal morbidities, needed more blood transfusion and required longer hospital stays. Operation performed in daytime found to have less mean blood loss (1,766 ml) compared to operation at nighttime (5,730 ml).

Conclusions: Placenta previa and multiparity were significant risk factors of cesarean hysterectomy. Cesarean section in these cases should be done by experienced obstetricians with good preoperative care and if possible, during the daytime. Before an operation, each patient and her family should be counseled and informed regarding the risk for complications included hysterectomy.

Keywords: Cesarean hysterectomy, Placenta previa, Case-control study

There are an increasing number of cesarean deliveries worldwide. Consequently, increased morbidities such as uterine rupture, placenta previa, placenta adherens, and other complications in afterward pregnancies are noted[1-3]. These conditions and the cesarean section increased the risk of postpartum hemorrhage that need prompt treatment, blood transfusion, and a prolonged hospital stay. Management of postpartum hemorrhage depends on the cause and severity of the bleeding. Uterine massage and uterotonic agents are effectively used to decrease massive hemorrhage by increasing myometrial contraction and occluding blood vessels[4,5]. However, peripartum or cesarean hysterectomy may be necessary in case of life-threatening hemorrhage at the time of abdominal delivery.

Cesarean hysterectomy is a hysterectomy that is performed 24 hours after the abdominal delivery[3]. Because of its difficulty and high morbidity, surgeons who perform this procedure should be experienced. To prevent serious maternal morbidity or mortality, preoperative care, especially the determination of pregnant women who is at high-risk for cesarean hysterectomy is very important[6,7]. The present study was conducted to identify the risk factors of cesarean hysterectomy in pregnant women delivered in King Chulalongkorn Memorial Hospital.

Material and Method

The present study was approved by the Ethics Committee of the Faculty of Medicine, Chulalongkorn

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University. This case-control study was conducted by reviewing the obstetric patient medical records in King Chulalongkorn Memorial Hospital from January 1994 to December 2004. The medical records were reviewed in an attempt to obtain the maximum information by using standardized data record form. Demographic data, clinical characteristics, and maternal and fetal outcomes were collected. Obstetric risks and complications were evaluated.

The cases included pregnant women who underwent hysterectomy at the time of abdominal delivery or within 24 hours after abdominal delivery. Eligible operation included hysterectomy performed after abdominal delivery. Any operation performed after vaginal delivery was excluded. Control group was selected by using random table numbers from women who had undergone cesarean section in the same month. The ratio of case to control was 1:5 (by table of random numbers).

Statistical analysis was performed by using SPSS for windows version 12.0. To test the difference of categorical variables, the chi-square test or Fisher's exact test were used. For continuous variables, comparisons were carried out with the student t test. A logistic regression analysis was used to investigate the relationship between selected risk factors and cesarean hysterectomy by calculating adjusted odds ratios together with 95% confidence intervals. P-value less than 0.05 were considered statistically significant.

Results

During the period of January 1, 1994 to December 31, 2004, 109,055 deliveries were done in King Chulalongkorn Memorial Hospital and 40,820 cases (37.4%) were by cesarean sections. Twenty-seven cesarean hysterectomies were performed. One case was elective, due to pregnancy with myoma uteri, and the other 26 were emergency cases. The overall incidence of cesarean hysterectomy was 0.25 per 1,000 deliveries. Two medical records were lost and the remaining 25 cases were included in the present study. Baseline characteristics of participants were shown in Table 1. Patients who underwent cesarean hysterectomy were significantly older than women in the cesarean section group were ($p < 0.001$) and most of them were multiparous. Mean age of the patients was 35.1 years (range 23-43), whereas it was 29.9 years (18-44) in the control group. Placenta previa was the leading indication for cesarean section in the case (68%) whereas cephalopelvic disproportion and previous cesarean section was the leading indications of cesarean section in the control (34.4% and 32.0% respectively). The other indications in the present study included fetal indications (malpresentation, nonreassuring fetal status), multifetal pregnancy and maternal diseases with unfavorable cervix.

The most frequent method used for control bleeding before hysterectomy was figure-of-eight suture at the bleeding point of placental base (5 cases).

Table 1. Demographic characteristics of the cases and controls

	Cesarean hysterectomy N = 25	Cesarean delivery N = 125	p-value
Age (year)			
mean (SD)	35.1 (4.3)	29.9 (5.5)	0.031
range	(23-43)	(18-44)	
Nullipara (case)	2 (8%)	62 (49.6%)	<0.01
Gestational age (week)			
mean (SD)	36.7 (3.3)	37.9 (1.9)	NS
range	(24-40)	(30-42)	
Body weight (kilogram)			
mean (SD)	65.7 (8.6)	66.6 (7.4)	NS
range	(50-84)	(47-90)	
Indication for C/S (case)			
CPD	1 (4%)	43 (34.4%)	0.025
Previous C/S	5 (20%)	40 (32.0%)	NS
Placenta previa	17 (68%)	3 (2.4%)	<0.001
Others	2 (8%)	39 (31.2%)	NS

CPD = Cephalopelvic disproportion, C/S = Cesarean section

The other methods were uterine curettage in two cases, uterine artery ligation in one case, internal iliac artery ligation in one case, and swab pack in one case. There was only one case where subtotal hysterectomy was performed; the others had total hysterectomies. There was no maternal mortality in the either groups. Table 2 compares the operative time, estimated blood loss, length of hospitalization, intra-and postoperative complications and perinatal outcomes between the two groups. The operative time, blood loss, length of hospital stay, placenta accreta, coagulopathy and febrile illness were higher in the case compared to the control. Newborns in the postpartum cesarean hysterectomy group had lower Apgar score at 5 minutes than those in the control (12% vs 0.8%). In cesarean hysterectomy women, the 15 cases operated in the day time had less blood loss (mean 1,766 milliliters, range 500-3,400 milliliters) than the cases operated at night time (N = 10, mean blood loss 5,730 milliliters, range 2,700-9,000 milliliters).

The results of multivariate logistic regression analysis are presented in Table 3. The significant independent risk factors for cesarean hysterectomy were placenta previa (adjusted OR = 67.96, 95%CI 15.32-301.46) and multiparity (adjusted OR = 7.30, 95%CI 1.24-43.19). Although the univariate analysis found significant association between cesarean hysterectomy and age $\geq$ 35 years-old, previous cesarean section, placenta accreta, the regression analysis showed no significant findings.

Discussion

Cesarean hysterectomy complicated 0.25 per 1,000 deliveries in the present study. This rate is lower than those of previous studies that were 0.41 to 1.55 per 1,000 deliveries[1-8] because the hysterectomy performed after vaginal delivery were excluded. In the present study, placenta previa and multiparity were the significant independent risk factors for cesarean hys-

Table 2. Operation and fetal outcomes

		Cesarean hysterectomy N = 25	Cesarean delivery N = 125	p-value
Operative time (minute)	mean (SD)	138.4 (46.5)	44.9 (10.2)	<0.001
	range	(50-240)	(30-90)	
Blood loss (milliliter)	mean (SD)	3,532 (2,440)	494 (204)	<0.001
	range	(800-9,000)	(200-1,500)	
Length of hospital stay (day)	mean (SD)	9.0 (3.8)	4.9 (1.6)	<0.001
	range	(5-18)	(3-10)	
Coagulopathy (cases)		12 (48%)	0	<0.001
Febrile morbidity (cases)		10 (40%)	27 (21.6%)	NS
Placenta accreta (cases)		7 (28%)	1 (0.8%)	<0.001
Fetal birthweight (gram)	mean (SD)	2,807 (684)	3,045 (427)	NS
	range	(1,600-4,015)	(1,350-4,000)	
Apgar score < 7 at 5 minute (case)		3 (12%)	1 (0.8%)	0.015
Fetal hospital stay (day)	mean (SD)	11 (3.2)	6 (2.1)	0.032
	range	(6-30)	(4-10)	

Table 3. Risk estimates of cesarean hysterectomy

Predictors	Adjusted Odds Ratio	95% Confidence Interval	p-value
Age $\geq$ 35	2.10	0.54-8.11	0.28
Multiparous	7.30	1.24-43.19	0.028
Gestational age (week)	1.00	0.75-1.33	0.98
Previous C/S	1.26	0.28-5.79	0.76
Placenta previa	67.96	15.32-301.46	<0.001
Placenta accreta	4.59	0.22-96.62	0.32

terectomy. They had more hazards and accounted for maternal and perinatal morbidity when compare with non-complicated cesarean delivery. This is because of the antepartum hemorrhage, preterm labor, intrapartum and postpartum hemorrhage, urinary tract infection, and coagulopathy. As in previous studies[2,6], cases with cesarean hysterectomy had longer operative time, more blood loss and coagulopathy, and longer hospital stays when compared to cases with cesarean delivery.

Placenta previa was the significant risk factor for cesarean hysterectomy in many studies[1-4,7,8]. Immediate postpartum uncontrolled hemorrhage during operation or postoperative period is the main indication for hysterectomy in women with placenta previa. The suture at the placental base was the favorite and most effective to perform as the first step to control the bleeding. However, some cases needed more interventions such as uterine or internal iliac vessels ligation or hysterectomy to control bleeding especially in cases complicated with placenta accreta.

The association between placenta accreta and placenta previa in women with a uterine scar was well established, and placenta accreta had become the foremost indication for emergency cesarean hysterectomy[5,6]. In the present study, no association between placenta accreta and cesarean hysterectomy was found from logistic regression analysis. This may be due to the small number of cases with placenta accreta in both groups (7 in 25 cases in cesarean hysterectomy and 1 in 125 cases in cesarean delivery). In the past, placenta accreta or other placenta adherens was suspected in women with placenta previa particularly in case of previous cesarean section scar. Nowadays, identification of abnormal adherent placentation by color Doppler sonography and magnetic resonance imaging (MRI) is possible[9-13]. Chou and colleagues identified variable vascular morphologic patterns of placenta previa accreta by using transabdominal color Doppler sonography in the antenatal period[10]. These patterns had a positive impact on the peripartum clinical management of patients. Twickler, et al found color flow Doppler mapping could predict myometrium invasion in women after cesarean section. Likewise, MRI was established as a promising technique for antepartum diagnosis of placenta accreta[12,13]. Thus, women with risk factors for placenta previa, placenta accreta, might benefit from early assessment placenta previa using imaging studies[12]. In case where these modalities suggested invasive placentation, elective surgery should be planned with highly skilled obstetricians and should be operated in the daytime.

The present study was a case-control study that had more advantage in identifying the risk factors than the previous studies, dealing with cesarean hysterectomy[1-5], that were mostly descriptive. Because there was small number of cases with cesarean hysterectomy, this study's design is more practical than cohort study to find the possible risk factors. However, there are difficulties in the selection of cases, the selection of controls, and obtaining data in case-control study. To minimize the possible bias, the control group in the present study was randomly selected from women who undergone cesarean section at the same period as this case study. The limitation of the present study was the nature of a retrospective study. Data obtained from medical records may not be complete and some variables might not have been verified such as placenta accreta, percreta etc.

In conclusion, independent risk factors for cesarean hysterectomy were placenta previa and multiparity. Cesarean deliveries in patients with placenta previa should be of particular concern. In addition, detailed informed consent to the possibility of hysterectomy and its associated morbidity should be obtained. If a patient had risk to cesarean hysterectomy, we recommend preparing blood component and performing the operation in the daytime when staffs and a full operative team is available. Future study should compare surgical procedures that are effective and easy to perform by general obstetricians to stop the bleeding in cases with cesarean delivery due to placenta previa.

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ปัจจัยเสี่ยงต่อการตัดมดลูกในการผ่าตัดคลอดบุตร

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วัตถุประสงค์: เพื่อหาปัจจัยเสี่ยงต่อการตัดมดลูกในการผ่าตัดคลอดบุตร

วัสดุและวิธีการ: ศึกษาแบบ *Case-control study* โดยการทบทวนเวชระเบียนสตรีที่คลอดในโรงพยาบาลจุฬาลงกรณ์ ตั้งแต่เดือนมกราคม พ.ศ. 2537 ถึงเดือนธันวาคม พ.ศ. 2547 กลุ่มผู้ป่วยได้แก่สตรีที่ได้รับการตัดมดลูกทันทีหรือภายใน 24 ชั่วโมงหลังผ่าตัดคลอดบุตร ส่วนกลุ่มควบคุมได้แก่สตรีที่ได้รับการผ่าตัดคลอดบุตรในช่วงเวลาเดียวกัน

ผลการศึกษา: สตรีคลอดบุตรทั้งหมด รวม 109,005 ราย มีผู้ป่วยได้รับการตัดมดลูกหลังผ่าตัดคลอดบุตรจำนวน 27 ราย (0.25/1000 การคลอด) จากการวิเคราะห์พหุปัจจัยพบปัจจัยเสี่ยงที่มีนัยสำคัญได้แก่ รกเกาะต่ำ (OR = 67.96, 95%CI = 15.32, 301.46) และเคยคลอดบุตรมาก่อน (OR = 7.30, 95%CI = 1.24, 43.19) เมื่อเปรียบเทียบกับกลุ่ม ควบคุม ผู้ป่วยได้รับการตัดมดลูกหลังผ่าตัดคลอดบุตรมีการบาดเจ็บในมารดาและทารกมากกว่า ต้องการรับโลหิต ทดแทนมากกว่า และนอนโรงพยาบาลนานกว่า การผ่าตัดในเวลากลางวันเสียเลือดเฉลี่ย (1,766 มล.) น้อยกว่า การผ่าตัดในเวลากลางคืน (5,730 มล.)

สรุป: รกเกาะต่ำและเคยคลอดบุตรมาก่อนเป็นปัจจัยเสี่ยงที่มีนัยสำคัญต่อการตัดมดลูกหลังผ่าตัดคลอดบุตร การผ่าตัดคลอดบุตรในผู้ป่วยเหล่านี้ควรทำโดยสูติแพทย์ที่มีประสบการณ์ เตรียมก่อนผ่าตัดอย่างดี และทำในช่วง กลางวัน ผู้ป่วยและญาติควรได้รับข้อมูลและคำปรึกษาแนะนำถึงภาวะแทรกซ้อนที่อาจเกิดขึ้นรวมถึงการตัดมดลูก