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Risk Factors for Cesarean Hysterectomy at Maharat Nakhon Ratchasima Hospital

Krittiya Dankhonsakul, M.D.*,
Oraphan Aswakul, M.D.*.

** Department of Obstetrics and Gynecology, Faculty of Medicine, Maharat Nakhon Ratchasima Hospital, Nakhonratchasima 30000, Thailand*

ABSTRACT

Objectives: To evaluate incidence, risk factors and complications of cesarean hysterectomy

Materials and Methods: This was a retrospective case-control study. The study cases included 80 pregnant women with cesarean hysterectomy at Maharat Nakhon Ratchasima Hospital from January 1st, 2010 to December 31st, 2015. The controls referred to 320 pregnant women who underwent cesarean section at the closest time before and after the study cases. The medical records were collected and analyzed. Multivariate logistic regression analysis was performed to identify risk factors.

Results: During the study period, there were 50,729 deliveries and 80 pregnant women with cesarean hysterectomy (1.58:1,000). The statistically significant risk factors for cesarean hysterectomy were placenta adherent (adjusted odds ratios (AOR) 120.91, 95% confidence interval (95% CI 22.05-1653.22), uterine atony (AOR 26.77, 95% CI 5.64-127.07), placenta previa (AOR 19.15, 95% CI 5.74-63.92), the tearing of lower uterine segment (AOR 14.92, 95% CI 4.92-45.29), multigravida (AOR 4.84, 95% CI 1.65-14.20) and emergency cesarean section (AOR 3.98, 95% CI 1.26-12.58). Hypovolemia, disseminated intravascular coagulation, postoperative fever and bladder injury were significant common complications.

Conclusion: Placenta adherent, uterine atony, placenta previa, the tearing of lower uterine segment, multigravida and emergency cesarean section were identified as significant risk factors for cesarean hysterectomy.

Keywords: cesarean hysterectomy, incidence, risk factors, complications, placental adherent, placenta previa, uterine atony

Correspondence to: *Krittiya Dankhonsakul, M.D., Department of Obstetrics and Gynecology, Faculty of Medicine, Maharat Nakhon Ratchasima Hospital, Nakhonratchasima 30000, Thailand, E-mail: codeblue55mim@hotmail.com*

ปัจจัยเสี่ยงที่สัมพันธ์กับการผ่าตัดมดลูกภายหลังการผ่าตัดคลอดบุตรในโรงพยาบาลมหาราชนครราชสีมา

กฤติยา ด่านคอนสกุล, อรพรรณ อัศวกุล

บทคัดย่อ

วัตถุประสงค์: *เพื่อศึกษาปัจจัยเสี่ยง อุบัติการณ์และภาวะแทรกซ้อนที่สัมพันธ์กับการผ่าตัดมดลูกภายหลังการผ่าตัดคลอดบุตร*

วัสดุและวิธีการ: *เป็นการศึกษาแบบ Retrospective Case-control โดยมีกลุ่มตัวอย่าง ได้แก่ สตรีตั้งครรภ์ 80 ราย ที่ได้รับการผ่าตัดมดลูกภายหลังการผ่าตัดคลอดบุตร ระหว่างวันที่ 1 มกราคม พ.ศ. 2553 ถึง 31 ธันวาคม พ.ศ. 2558 กลุ่มควบคุมคัดเลือกจากสตรีตั้งครรภ์ 320 ราย ที่ได้รับการผ่าตัดคลอดก่อนและหลังกลุ่มตัวอย่าง จากนั้นรวบรวมข้อมูลปัจจัยเสี่ยงที่สัมพันธ์กับการผ่าตัดมดลูกภายหลังการผ่าตัดคลอด โดยใช้การวิเคราะห์ปัจจัยเสี่ยงแบบ Multivariate logistic regression*

ผลการศึกษา: *สตรีตั้งครรภ์ที่มาคลอดบุตรในโรงพยาบาลมหาราชนครราชสีมา 50,729 ราย ได้รับการผ่าตัดมดลูกภายหลังการผ่าตัดคลอดบุตร 80 ราย คิดเป็น 1.58 ต่อ 1,000 การคลอด ปัจจัยที่สัมพันธ์กับการผ่าตัดมดลูก ได้แก่ รกเกาะแน่น มีค่า adjusted odds ratios (AOR) เท่ากับ 120.91 (95% confidence interval (95% CI) 22.05-1653.22) มดลูกไม่หดรัดตัว มีค่า AOR เท่ากับ 26.77 (95% CI 5.64-127.07) รกเกาะต่ำ มีค่า AOR เท่ากับ 19.15 (95% CI 5.74-63.92) บาดแผลที่ส่วนล่างของมดลูก มีค่า AOR เท่ากับ 14.92 (95% CI 4.92-45.29) ตั้งครรภ์มากกว่า 1 ครั้งมีค่า AOR เท่ากับ 4.84 (95% CI 1.65-14.20) และการผ่าตัดคลอดบุตรฉุกเฉิน มีค่า AOR เท่ากับ 3.98 (95% CI 1.26-12.58) พบว่าวะแทรกซ้อนภายหลังการผ่าตัดมดลูก ได้แก่ ภาวะความดันโลหิตต่ำ การแข็งตัวของเลือดผิดปกติ ไข้หลัง 24 ชั่วโมงหลังผ่าตัด การบาดเจ็บต่อกระเพาะปัสสาวะ*

สรุป: *อัตราการผ่าตัดมดลูกภายหลังการผ่าตัดคลอดในโรงพยาบาลมหาราชนครราชสีมา คิดเป็น 1.58 ต่อการคลอด 1,000 ราย โดยมีปัจจัยเสี่ยงที่สำคัญ ได้แก่ รกเกาะแน่น มดลูกไม่หดรัดตัว รกเกาะต่ำ บาดแผลที่ส่วนล่างของมดลูก การตั้งครรภ์มากกว่า 1 ครั้ง และการผ่าตัดคลอดบุตรฉุกเฉิน*

คำสำคัญ: *การผ่าตัดมดลูกภายหลังการผ่าตัดคลอดบุตร, อุบัติการณ์, ปัจจัยเสี่ยง, ภาวะแทรกซ้อน, รกเกาะแน่น, รกเกาะต่ำ, มดลูกไม่หดรัดตัว*

Introduction

Twenty years ago, the cesarean section rate in the United State had been increasing but in the past ten years, it has been constant as one-third of deliveries[1, 2]. The rate of cesarean in developing countries including Thailand has tended to be elevated over twenty years[3,4]. Comparing with the normal delivery, the cesarean section is more associated with hemorrhage in both short-term and long-term effects. In addition, the pregnant women who had previous cesarean section are at risk of uterine rupture, placenta previa and placenta adherent[5] which are the causes of hemorrhage leading to adverse consequences such as hypotension, excessive clotting disorder, cesarean hysterectomy and complications of operation. Since pregnant women have exposed to risk of morbidity or mortality, the use of medical resources for treatment, such as blood and plasma transfusion, administration of antibiotics, long period of hospitalization and the nursing care in intensive care unit, are increasingly needed.

Postpartum hemorrhage has been one of the most important health issues in regard to the mortality of one-fourth of the mothers worldwide[6]. The postpartum hemorrhage-treatments consist of uterine massage, administration of uterine drugs to stimulate the contraction of uterine muscle and cesarean hysterectomy to moderate the life-threatening condition of the mothers with high blood loss and failed conservative treatment.

Cesarean hysterectomy is described as the hysterectomy during cesarean section or within 24 hours after section. Previous studies reported the incidence rate of cesarean hysterectomy as 0.25 cases per 1,000 deliveries in King Chulalongkorn Memorial Hospital[7] and 0.96 cases per 1,000 deliveries in Vajira Hospital[8].

Maharat Nakhon Ratchasima Hospital is the regional medical school. Moreover, it is the medical center of transfer cases from many hospitals around north eastern region resulting in higher risk patients. In this study, we aimed to evaluate incidence, risk factors and complications of cesarean hysterectomy for the patients admitted in Maharat Nakhon Ratchasima Hospital in order to establish the management for risk patients. For instance, the preoperative procedures for doctors, nurses, blood bank and operation rooms should be established, and the prevention of complications should be aware. Furthermore, patients and their families should be advised before the operation to moderate the risk of accusation and to improve the nurse efficiency for these risk patients.

Materials and Methods

A restrospective case-control study was approved by Maharat Nakhon Ratchasima Hospital Institutional Review Board (MNRH IRB). All pregnant women with gestational age ≥ 24 weeks who had cesarean delivery at Maharat Nakhon Ratchasima Hospital between January 1st, 2010 and December 31st, 2015 were reviewed. Patients who had incomplete medical records and elective cesarean hysterectomy for treatments of leiomyoma uteri, cancer were excluded.

The study cases were all pregnant women who had cesarean hysterectomy whereas controls referred to pregnant women who underwent cesarean section at the closest time before (two patients) and after (two patients) the same study cases by ratio of 1:4 (case: control). Risk factors for cesarean hysterectomy were primary outcome whereas secondary outcome were incidence and complications.

Maternal characteristics such as demographic data, age, gravida, parity, gestational age, maternal body mass index (BMI), previous uterine curettage, indications for cesarean section and complications were acquired from electronic medical records. The potential risk factors such as placenta adherent, tearing of lower segment of uterus and uterine atony were identified.

Statistical analysis

All analysis was conducted using the STATA/SE version 11.1 for windows. Categorical variables were tested using the Chi-square or Fisher's exact

test. For continuous variable, comparisons were carried out with the t-test. Stepwise, multivariate 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. The results were considered statistically significant when $p < 0.05$.

Results

During the last six years from January 1st, 2010 until December 31st, 2015, there were 50,729 deliveries and 25,908 cesarean deliveries in Maharat Nakhon Ratchasima Hospital. The incidence rate of cesarean hysterectomy was 1.58 cases per 1,000 deliveries. Of 88 pregnant women who had cesarean hysterectomy, 8 patients were excluded including 4 patients with leiomyoma uteri, 3 patients with gynecologic cancer and 1 patient with non-gynecologic cancer. Thus, 80 patients were recruited as cases. Furthermore, 320 pregnant women who had cesarean section at the time before and after case studies were grouped as controls. The incidence of cesarean hysterectomy in each year was showed in Fig. 1 and the tendency of incidence was not different.

Univariate logistic regression analysis of the risk factors for cesarean hysterectomy was presented in Table 1 showed that maternal age, gravida, parity, gestational age and previous uterine curettage between cases and controls were significantly different. Cases tended to be older than controls. Gravida and parity of the study cases were significantly greater than the controls. Significantly, 31.3 percent of cases had previous uterine curettage and this was significantly greater than the controls (11.6%). Nevertheless, another general data consisting of BMI, smoking status, preeclampsia and administration of oxytocin, was not statistically different comparing between cases and controls.

Significantly, the study cases were transferred and underwent emergency cesarean delivery greater than controls. Previous cesarean section (42.5%) and placenta previa (33.8%) were statistically significant indications for cesarean deliveries greater than controls. There was no difference in malpresentation of cases and controls. Hemorrhage-related factors were placental adherent (40%), uterine atony (26%), placenta previa (20%), placental adherent with placental previa (18.8%) and tear lower uterine segment (17.5%).

By multivariate logistic regression analysis (Table 2.), the risk factors which significantly associated with cesarean hysterectomy comprised of placenta adherent (adjusted odds ratios (AOR) 120.91, 95% confidence interval (95%CI 22.05-1653.22), uterine atony (AOR 26.77, 95%CI 5.64-127.07), placenta previa (AOR 19.15, 95%CI 5.74-63.92), the tearing of lower uterine segment (AOR 14.92, 95%CI 4.92-45.29), multigravida (AOR 4.84, 95%CI 1.65-14.20) and emergency cesarean section (AOR 3.98, 95%CI 1.26-12.58).

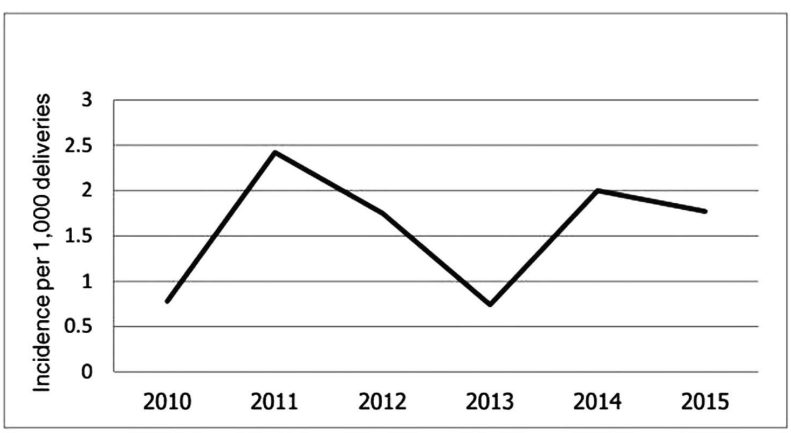

Fig. 1. Incidence of cesarean hysterectomy.

Table 1. Univariate logistic regression analysis of risk factors for cesarean hysterectomy.

Characteristics	Cases n = 80 n (%)	Controls n = 320 n (%)	OR (95% CI)	p value
Age (years)				
< 35	47 (58.8)	258 (80.6)	1	
≥ 35	33 (41.2)	62 (19.4)	2.92 (1.66-5.09)	< 0.001*
BMI (kg/m^2)				
< 25	23 (32.4)	69 (22.5)	1	
≥ 25	48 (67.6)	238 (77.5)	0.61 (0.33-1.12)	0.092
Gravida				
1	9 (11.2)	133 (41.6)	1	
≥ 2	71 (88.8)	187 (58.4)	5.61 (2.66-13.18)	<0.001*
Parity				
Nullirarous	14 (17.5)	154 (48.1)	1	
Muliparous	66 (82.5)	166 (51.9)	4.37 (2.31-8.76)	0.001*
Gestational age (weeks)				
24-33	15 (18.8)	12 (3.8)	1	
34-36	20 (25.0)	32 (10.0)	0.5 (0.17-1.42)	0.147
≥ 37	45 (56.2)	276 (86.2)	0.13 (0.05-0.32)	<0.001*
Previous uterine curettage				
No	55 (68.8)	283 (88.4)	1	
Yes	25 (31.2)	37 (11.6)	3.48 (1.84-6.46)	<0.001*
Smoking				
No	70 (94.6)	284 (93.4)	1	
Yes	4 (5.4)	20 (6.6)	0.81 (0.20-2.53)	1.000
Augmentation (Syntocinon)				
No	71 (88.8)	286 (89.4)	1	
Yes	9 (11.2)	34 (10.6)	1.07 (0.43-2.40)	0.872
Preeclampsia	6 (7.5)	23 (7.2)	1.05 (0.34-2.77)	0.923
Transfer	39 (48.8)	74 (23.1)	1.36 (1.84-5.43)	< 0.001*
Emergency C/S	66 (82.5)	213 (66.6)	2.37 (1.24-4.77)	0.006*
Indications for Cesarean delivery				
Previous C/S	34 (42.5)	94 (29.4)	1.77 (1.04-3.03)	0.032*
Placenta previa	27 (33.8)	8 (2.5)	19.87 (8.14-52.77)	< 0.001*
CPD	16 (20.0)	124 (38.8)	0.40 (0.20-0.73)	0.002*
Mal-presentation	12 (15.0)	40 (12.5)	1.24 (0.56-2.56)	0.578
Hemorrhage-related factors				
Placental adherent	32 (40.0)	1 (0.3)	212.67 (33.28-8682.40)	< 0.001*
Placenta previa	16 (20.0)	0 (0.0)		< 0.001*
Uterine atony	20 (26.0)	4 (1.3)	27.72 (8.73-114.15)	<0.001*
Tear lower uterine segment	14 (17.5)	9 (2.8)	7.33 (2.80-19.93)	<0.001*
Placenta adherent with placenta previa	15 (18.8)	0 (0.0)		<0.001*

OR = odds ratios, 95%CI = 95% confidence interval, BMI = body mass index

Table 2. Multivariate logistic regression analysis of the risk factors for cesarean hysterectomy.

Risk factors	Adjusted OR	95% confidence interval	p value
Emergency cesarean section	3.98	1.26-12.58	0.018
Multigravida	4.84	1.65-14.20	0.004
Tear lower uterine segment	14.92	4.92-45.29	< 0.001
Placenta previa	19.15	5.74-63.92	< 0.001
Uterine atony	26.77	5.64-127.07	< 0.001
Placental adherent	120.91	22.05-1653.22	< 0.001

Significantly, the complications after operation were detected in cases more frequently than controls including hypovolemia (42.5%), excessive clotting disorder (32.5%) and post-operative fever (41.3%). Besides, 6 patients had injury of urinary bladder (7.5%), 2 mothers died (2.5%) as shown in Table 3. The death of two mothers was a result of uterine atony and one of them had the comorbidity of HELLP syndrome. The study cases were associated with greater blood loss, more transfusion and longer hospitalizations than controls.

Table 3. Post-operative complications.

Characteristics	Cases n = 80 n (%)	Controls n = 320 n (%)	p value
Hypovolemia	34 (42.5)	3 (0.9)	< 0.001*
Coagulopathy	26 (32.5)	0 (0.0)	< 0.001*
Postoperative fever	33 (41.3)	8 (2.5)	< 0.001*
Bladder injury	6 (7.5)	0 (0.0)	< 0.001*
Bowel injury	1 (1.3)	0 (0.0)	0.200
Maternal mortality	2 (2.5)	0 (0.0)	0.040*
Blood loss (ml)(mean SD)	2696.25 (1639.50)	465.16 (219.85)	< 0.001*
Blood transfusions (mean SD)	4.98 (3.70)	0.08 (0.56)	0.022*
Length of hospital stay(day) (mean SD)	8.93 (17.56)	3.89 (1.97)	0.012*

* $p < 0.05$ = statistical significant

Discussion

The incidence of cesarean hysterectomy in Maharat Nakhon Ratchasima Hospital was 1.58 cases per 1,000 deliveries. This was higher than previous report by medical centers in Thailand which varied from 0.25 to 0.96 per 1,000 deliveries[7, 8]. The higher incidence might be attributed to a large number of referred high risk cases. Patients who admitted in Maharat Nakhon Ratchasima Hospital were transferred from other hospitals around north eastern region. Distance of patient transfer was longer than transfer between medical schools in Bangkok.

This study revealed that risk factors for cesarean hysterectomy comprised of placenta adherent, uterine

atony, placenta previa, multigravida and emergency cesarean section. These also concurred with many studies[8-13]. But the tearing of lower uterine segment had been reported in this study. After multivariate logistic regression, this study did not find a significantly increase risk of cesarean hysterectomy in women with previous cesarean section, previous uterine curettage, advanced maternal age, most of which have been previously reported to be risk factors[13-17].

In this study, cesarean hysterectomy was associated with tearing of lower uterine segment and emergency cesarean section, which is due to distance of patients transferred from another hospitals may result in lack of preparation for the surgery. In particularly, high risk cases such as patients with previous cesarean section and placenta previa had increased risk of complications. These factors might be increased incidence of cesarean hysterectomy in this study. However, the data in this study was expectedly beneficial to promote development of high risk patient care and transfer strategies in collaboration with another hospitals.

Uterine atony and placental factors including placental adherent and placenta previa were primary cause of postpartum haemorrhage which should be correct to prevent morbidity and mortality[18]. Previous study of postpartum hemorrhage in Maharat Nakhon Ratchasima Hospital reported that 1.6% of patients had postpartum hemorrhage which uterine atony, tear birth canal and placenta previa were the most leading causes of postpartum hemorrhage[19]. However, some factors, for example induction of labour, prolonged labour, preeclapmsia, enlarged uterus and chorioamnionitis were correlated with uterine atony resulting in postpartum hemorrhage[18]. The treatments of postpartum hemorrhage consisted of uterine massage, administration of uterotonic agents such as oxytocin, methylergometrine, misoprostol and dinoprostone, uterine tamponade and surgical intervention, for instance uterine artery ligation, hypogastric artery ligation and B-Lynch suture[18, 20] which was advantageous to reduce the postpartum hemorrhage considerably. Currently, Maharat Nakhon Ratchasima Hospital has performed the surgical intervention, especially B-Lynch suture, more frequently than another methods, however, the tendency of cesarean hysterectomy incidence was not significantly different from the past year which was possibly related to various factors such as physicians, patients or surgical technique.

In this study, patients with cesarean hysterectomy had blood loss, blood transfusion, hypotension, postoperative surgery and injuries of adjacent organs such as urinary bladder leading to longer periods of operation and hospital stay which were consistent with previous studies[7-8, 14, 21-22]. Additionally, the death of two mothers in this study was a result of uterine atony and one of them had the comorbidity of HELLP syndrome.

Risk factors for cesarean hysterectomy in this study were valuable to preoperative preparation such as physicians, nurses and blood bank and to advise patients and their families on risks of hysterectomy which was expected to enhance treatment capability and decrease the issue on accusations. The early identification of patient and awareness of these risks can reduce the morbidity and mortality due to cesarean hysterectomy.

The limitation of this study was that the study was designed as the retrospective study. The data was collected from the electronic medical records retrospectively. Therefore, some data was incomplete or missing. However, the proportion of control groups designed for this study was 1:4 to improve the efficiency of the analysis and, additionally, to search for the significant risk factors.

Conclusion

Placenta adherent, uterine atony, placenta previa, the tearing of lower segment of uterus, multigravida and emergency cesarean section were the risk factors for cesarean hysterectomy in Maharat Nakhon Ratchasima Hospital.

Potential conflicts of interest

The authors declare no conflict of interest.

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