

OBSTETRICS

Risk Factors of Emergency Peripartum Hysterectomy

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ABSTRACT

Objective: To evaluate the incidence and risk factors of emergency peripartum hysterectomy
Materials and Methods: A case-control study was conducted in the pregnant women who delivered at Ramathibodi Hospital, Bangkok, Thailand during January 2002 - December 2013. The study cases refer to pregnant women with gestational age ≥ 28 weeks who underwent emergency peripartum hysterectomy following cesarean or vaginal delivery. The control cases refer to pregnant women who delivered before and after the study cases by matching time and route of delivery. The medical records were collected and analysed. Multivariate logistic regression analysis was used to identify independent risk factors and the related adjusted odds ratios (aOR) and 95% confidence intervals (95% CI).
Results: During the study period, there were 64 cases of emergency peripartum hysterectomy out of 48,970 deliveries (1.31:1,000 deliveries). In the completed data 60 cases, the indications for surgery were uterine atony 29 cases (48.3%) and placental factors 31 cases (51.7%). The placental factors included placenta accrete syndromes with placenta previa 15 cases (25%), placenta previa 9 cases (15%), placenta accrete syndromes 5 cases (8.3%) and abruptio placenta 2 cases (3.3%). According to multivariate analysis, independent risk factors were uterine atony (aOR = 170.7, 95% CI 42.1-692.7), placental factors (aOR = 130, 95% CI 33.1-516.2), birth weight $\geq 4,000$ gm (aOR = 12.4, 95% CI 1.6-93.7).
Conclusions: The incidence of emergency peripartum hysterectomy was 1.31: 1,000 deliveries. Uterine atony, placental factors, and birth weight $\geq 4,000$ gm were significant risk factors.

Keywords: emergency peripartum hysterectomy, risk factors, incidence

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Introduction

Postpartum hemorrhage is the leading cause of maternal mortality in low-income countries and the primary cause of nearly one quarter of all maternal

deaths globally⁽¹⁾. Optimizing treatment of postpartum hemorrhage may decrease the incidence of peripartum hysterectomy⁽²⁾.

Emergency peripartum hysterectomy is defined

as a hysterectomy carried out for hemorrhage unresponsive to conservative treatment within 24 hours of delivery⁽³⁾. It is considered one of the most devastating complications in obstetrics resulting in high costs to the health care system and adverse outcomes for woman desiring to maintain their fertility⁽⁴⁾. Despite its significant association with increased maternal morbidity and mortality, it is a potentially life saving procedure⁽⁵⁾. The previous studies showed the incidence of emergency peripartum hysterectomy 0.13-2.2 per 1,000 deliveries^(4, 6-10). The most common indication for emergent procedures is severe uterine hemorrhage that cannot be controlled by conservative treatments. Such hemorrhage is most commonly due to abnormal placentation or uterine atony, with each accounting for 30 to 50 percent of peripartum hysterectomies^(2,4,11-12). Another risk factors for peripartum hysterectomy have been established, including ruptured uterus, previous cesarean delivery, leiomyoma, multifetal gestation, diabetic mellitus, pre-eclampsia⁽¹³⁻¹⁸⁾.

Therefore the purpose of our study is to evaluate the incidence and identify pregnant women at risk factors of emergency peripartum hysterectomy.

Materials and Methods

This study was performed as retrospective case-control study and approved by Ethical clearance committee on human rights related to researches involving human subjects. A retrospective chart review of pregnant women with gestational age ≥ 28 weeks who delivered at Ramathibodi Hospital, Mahidol University, Bangkok, Thailand during January 2002-December 2013 was conducted. Emergency peripartum hysterectomy defined as cesarean hysterectomy or hysterectomy performed within 24 hours after delivery. The case refers to pregnant women who underwent emergency peripartum hysterectomy within 24 hours following cesarean or vaginal delivery. The control refers to pregnant women by matching the route of delivery and time, matching two pregnant women who delivered before study cases and two pregnant women who delivered after the study cases (case : control = 1:4). Incomplete medical records or loss to follow up were excluded. The medical records

were reviewed for maternal demographic data such as age, weight, height, BMI, gravidity, parity and gestational age. The associated risk factors; birth weight, blood loss, maternal complication, multiple gestation, previous curettage, induction, augmentation, second to third stage management by syntocinon or methylergometrine, placental factors and uterine atony were identified from medical records. Pathological examination of specimens were performed to confirm the indication of emergency peripartum hysterectomy in our study.

Statistical analyses were performed using the STATA version 13.0. Multivariate analysis using logistic regression was carried out with emergency peripartum hysterectomy as the final outcome. Difference between cases and controls were compared with the Mann-Whitney U test and the χ^2 test or Fisher's exact. Adjusted odds ratio (OR) and 95% confidence intervals (95% CI) were calculated using logistic regression, the p-value less than 0.05 was considered statistically significant.

Results

During the 12-years study period, there were sixty-four pregnant women who underwent emergency peripartum hysterectomy from total of 48,970 deliveries. The incidence for emergency peripartum hysterectomy was 1.31 per 1,000 deliveries. Three hundred and four pregnant women were enrolled, sixty-four women into case group and two hundred and forty into control group. Four women in case group were excluded from the study because of data loss. Demographic data of cases and controls were shown in Table 1, demographic characteristics in both groups were no statistically significant different.

In the completed data of sixty cases, the indications of emergency peripartum hysterectomy were uterine atony 29 cases (48.3%) and placental factors 31 cases (51.7%). The placental factors included placenta accrete syndromes with placenta previa 15 cases (25%), placenta previa 9 cases (15%), placenta accrete syndromes 5 cases (8.3%) and abruptio placenta 2 cases (3.3%). Route of delivery were cesarean section 52 case (86.6%), vaginal delivery 6 cases (10%), vacuum extraction 1 case (1.7%), forceps

extraction 1 case (1.7%). The incidence of emergency peripartum hysterectomy each year showed in Fig. 1, the trend of the incidence is increasing. The indication of pregnant women who underwent emergency peripartum hysterectomy (N=60) were shown in Fig. 2,

it could be subdivided into two categories: the first half of study period was uterine atony while in the second half was the placental factors included placenta previa, placenta accrete syndromes and placenta previa with placenta accrete syndromes.

Table 1. Demographic characteristics.

Characteristics	Case (n = 60)	Control (n = 240)	P
Age (yr)			
Median (min, max)	31.0 (16,44)	30.0 (17,42)	0.643
Weight (kg)			
Median (min, max)	67.4 (48,97)	65.4 (45,100)	0.548
Height (cm)			
Median (min, max)	155.0 (145,170)	154.6 (149,171)	0.494
BMI (kg/m²)			
Median (min, max)	27.8 (19,48)	26.9 (18,45)	0.745
Gravida			
Median (min, max)	2.0 (1,7)	2.0 (1,6)	0.678
Parity			
Median (min, max)	1.0 (0,3)	1.0 (0,4)	0.443

* Mann-Whitney U test

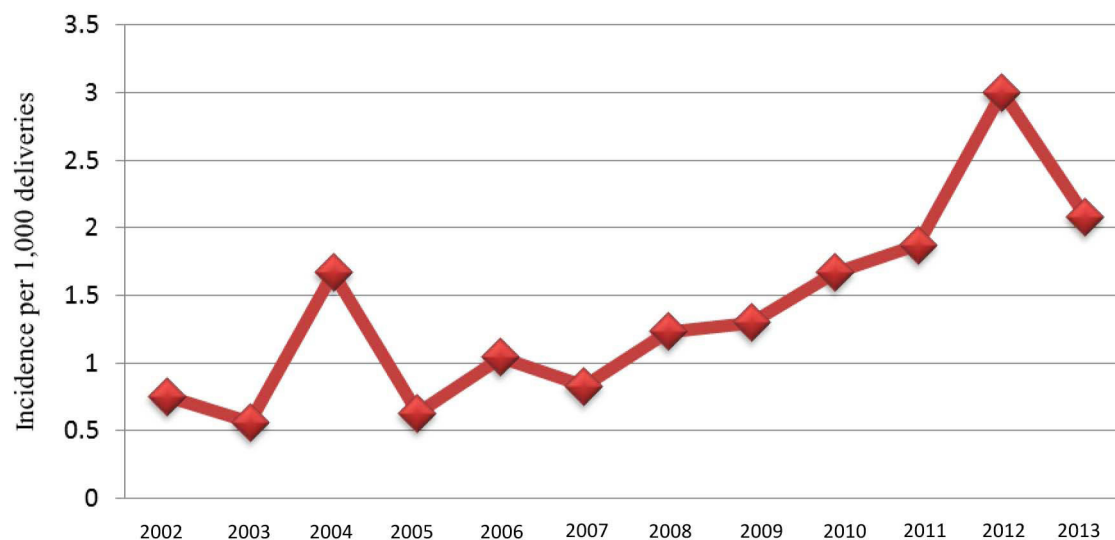


Fig. 1. Incidence of emergency peripartum hysterectomy.

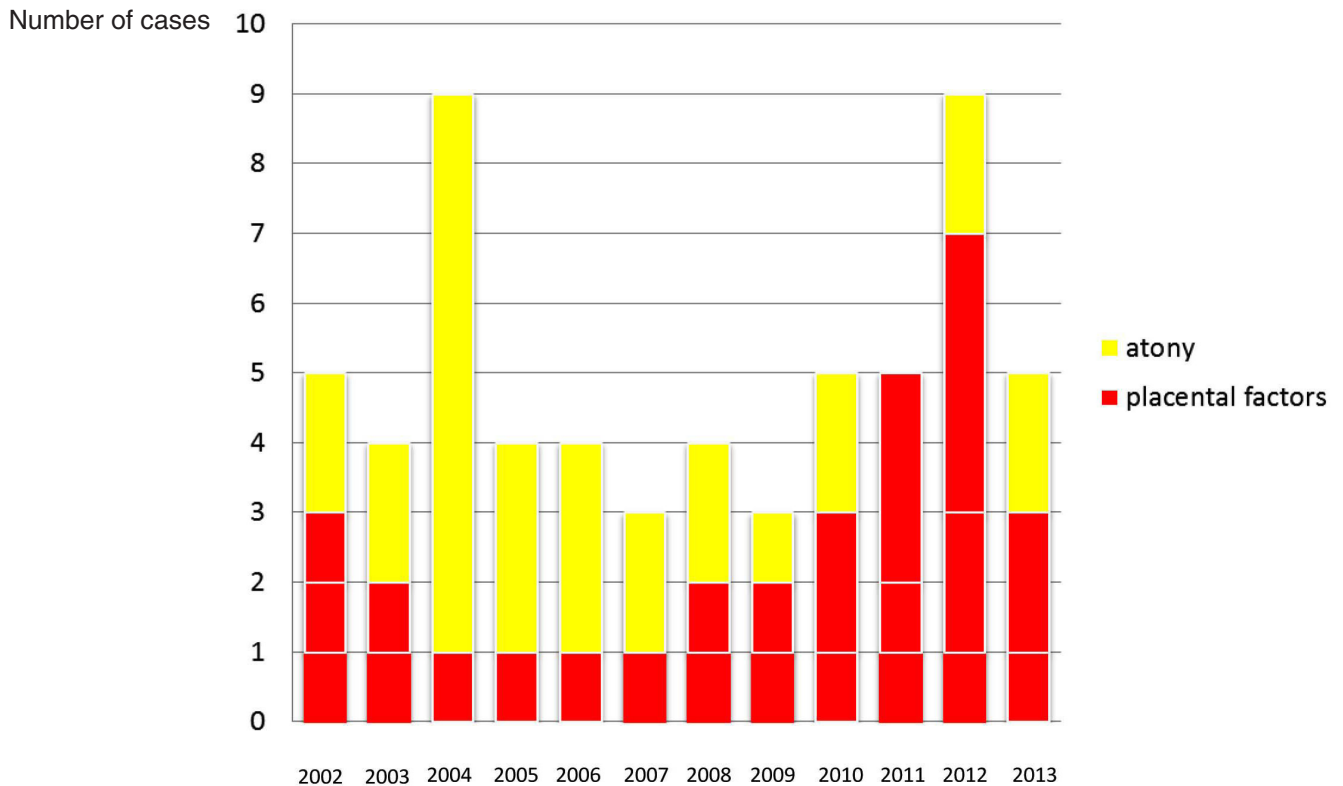


Fig. 2. Emergency peripartum hysterectomy classified with indication for hysterectomy (N=60)

The results of univariate logistic regression analysis were shown in Table 2, there was statistically significant difference in age ≥ 35 yr (OR = 2.9, 95% CI 1.6-5.3), weight > 70 kg (OR = 2.2, 95% CI 1.2-4.1), height < 150 cm (OR = 0.1, 95% CI 0.1-0.4), BMI ≥ 30 kg/m² (OR = 3.0, 95% CI 1.5-6.0), gravidity ≥ 2 (OR = 2.0, 95% CI 1.1-3.6), parity ≥ 1 (OR = 1.4, 95% CI 1.0-4.5), GA 28-36⁺⁶ weeks (OR = 0.3, 95% CI 0.1-0.5), birth weight $\geq 4,000$ gm (OR = 10.3, 95% CI 1.8-58.2), blood loss $> 1,000$ ml (OR = 4.0, 95% CI 2.1-5.6), GDM (OR = 2.6, 95% CI 3.7-34.4), placental factors (OR = 17.3, 95% CI 8.2-36.1) and uterine atony (OR = 17.8, 95% CI 8.2-38.3) between both groups. The results of multivariate logistic regression analysis are shown independent risk factors of emergency peripartum hysterectomy in this study were uterine atony (aOR = 170.7, 95% CI 42.1-629.0), placenta factors (aOR = 130.6, 95% CI 33.1-516.2), birth weight $\geq 4,000$ gm (aOR = 12.4, 95% CI 1.6-93.7).

However, other factors such as severe preeclampsia, multifetal gestation, previous curettage, induction and augmentation of labor and second to third stage of management by syntocinon or methylergometrine were not statistically significant difference.

Table 2. Univariate logistic regression analysis for emergency peripartum hysterectomy.

Characteristics	Case (N=60)	Control (N=240)	OR (95%CI)	P
Age (yr)				
< 35	31 (51.7)	182 (75.8)	-	0.268
≥ 35	29 (48.3)	58 (24.2)	2.9 (1.6-5.3)	< 0.001*
Weight (kg)				
< 70	36 (60.0)	185 (77.1)	-	0.457
> 70	24 (40.0)	55 (22.9)	2.2 (1.2-4.1)	0.007*
Height (cm)				
< 150	8 (13.3)	4 (1.7)	0.1 (0.1-0.4)	< 0.001*
≥ 150	52 (86.7)	236 (98.3)	-	0.382
BMI (kg/m²)				
< 30	44 (73.3)	214 (89.2)	-	0.475
≥ 30	16 (26.7)	26 (10.8)	3.0 (1.5-6.0)	0.002*
Gravida				
1	17 (28.3)	105 (43.8)	-	0.143
≥ 2	43 (71.7)	135 (56.2)	2.0 (1.1-3.6)	0.030*
Parity				
0	22 (36.7)	124 (51.7)	-	0.256
≥1	38 (63.3)	116 (48.3)	1.4 (1.0-4.5)	0.038*
GA (weeks)				
28-36+6	18 (30.0)	21 (8.6)	0.3 (0.1-0.5)	< 0.001*
≥ 37	42 (70.0)	219 (91.3)	-	0.106
Birth weight(gm)				
< 2,500	11 (18.3)	5 (2.1)	-	0.245
2,500-3,999	45 (75.0)	233 (97.1)	-	0.356
≥ 4,000	44 (6.7)	2 (0.8)	10.3 (1.8-58.2)	< 0.001*
Blood loss (mL)				
<1,000	0 (0.0)	220 (91.7)	-	0.127
≥1,000	60 (100.0)	20 (8.3)	4.0 (2.1-5.6)	< 0.001*
Maternal complication				
GDM	8 (13.3)	49 (20.4)	2.6 (3.7-34.4)	< 0.001*
Severe preeclampsia	3 (5.0)	8 (3.3)	-	0.54
Multifetal Gestation	2 (25.0)	6 (75.0)	-	0.662
Previous Curettage	7 (15.2)	39 (84.8)	-	0.378
Induction	5 (17.2)	24 (82.8)	-	0.696
Augmentation	35 (23.2)	116 (76.8)	-	0.166
Second to third stage management				
Syntocinon	50 (20.0)	200 (80.0)	-	1.000
Methergin	45 (23.8)	150 (76.9)	-	0.069
Placental factors	31 (51.7)	16 (6.7)	17.3 (8.2-36.1)	< 0.001*

Table 2. Univariate logistic regression analysis for emergency peripartum hysterectomy. (Cont.)

Characteristics	Case (N=60)	Control (N=240)	OR (95%CI)	P
Abruptio	2 (3.3)	0 (0.0)	-	0.039*
Placenta accrete syndromes	5 (8.3)	0 (0.0)	-	< 0.001*
Placenta previa	9 (15.0)	16 (6.7)	6 (2.2-16.5)	0.037*
Placenta accrete syndromes with placenta previa	15 (25.0)	0 (0.0)	-	< 0.001*
Uterine atony	15 (25.0)	0 (0.0)	-	< 0.001*

* P < 0.05 = statistical significant, OR = odds ratios, 95%CI = 95% interval confidence

Discussion

The incidence of emergency peripartum hysterectomy in our study was 1.31 per 1,000 deliveries, correspond to 0.13 to 2.2 per 1,000 deliveries from previous studies^(4, 6-10). In the present study, the trend of the incidence per 1,000 deliveries each year is increasing. The indications for emergency peripartum hysterectomy in the first half of study period were mainly uterine atony but in the second half were the placental factors.

The independent risk factors of emergency peripartum hysterectomy in the present study were uterine atony, placental factors and birth weight $\geq 4,000$ gm. This finding was accordance with that of many recent studies^(2, 4, 10-16). Indications like uterine atony, placenta previa, placenta accrete syndromes in our study were also common indication for emergency peripartum hysterectomy in previous studies^(6, 18-22). Our study did not find a significantly increased risk of emergency peripartum hysterectomy in women with severe preeclampsia, multifetal gestation, previous curettage, most of which have been previously reported to be risk factors of emergency peripartum hysterectomy^(6,23).

Birth weight $\geq 4,000$ gm or macrosomia is related to overdistention of uterus and uterine atony which is the leading risk factors of emergency peripartum hysterectomy⁽²⁴⁾. Uterine atony could be early detected and prophylactic intervention should be done by medical and surgical technique⁽²⁵⁻²⁶⁾. The evidence indicates that morbidity and mortality due to emergency peripartum hysterectomy can be reduced with the

awareness of these risk. In Ramathibodi Hospital, all patients who had risk of uterine atony received conservative management steps including bimanual uterine massage, uterotonic agents (syntocinon, methylergometrine, misoprostol, sulprostone), some of them received surgical steps including B-lynch suture, uterine artery ligation and bilateral hypogastrics artery ligation. Emergency peripartum hysterectomy was considered to be a life-saving procedure. Since 2008, B-lynch suture was introduced in Ramathibodi Hospital, the trend of emergency peripartum hysterectomy from uterine atony was decreasing. Recently, placental factors have been shown to increase risk of emergency peripartum hysterectomy in this study, which were also recognized in other studies^(6, 10, 19, 21-22). Therefore we should be aware of any factors that increase risk of placenta previa and placenta accrete syndromes such as uterine scar or curettage. Fortunately, placenta previa and placenta accrete syndromes are recognizable antepartum with the help of imaging. Finding on Doppler sonography or MRI should be used to evaluate abnormal adherent placentation in the antenatal period and can help obstetricians realize the potential risk for massive blood loss after delivery with placenta previa or placenta accrete syndromes and thus can improve perinatal outcome⁽²¹⁻²²⁾.

Route of deliveries; vaginal delivery, vacuum extraction, forceps extraction and cesarean section that included primary cesarean section, repeated cesarean section were not statistically significant different. The result differs from previous studies because of the present study matching the route of

delivery and time^(17, 27-29).

Since study was a retrospective study, it was limited by incomplete and loss of data from medical. However, our study has case: control = 1:4 by matching the route of delivery and time, thus provided adequate sample size for identifying risk factors.

Our study identified risk factors of emergency peripartum hysterectomy, this situation may be prevented if high risk cases were properly managed. Proper management included better information to the patient, preparation experienced obstetricians and other disciplines involved anesthesiologist, pediatrician, operating team and adequate blood components. Finally, the occurrence of lawsuits form serious outcome in unavailable cases may be reduced.

Conclusions

The incidence of emergency peripartum hysterectomy was 1.31: 1,000 deliveries in Ramathibodi Hospital. Placental factors, uterine atony and birth weight $\geq 4,000$ gm were significant risk factors of emergency peripartum hysterectomy.

Acknowledgment

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ปัจจัยเสี่ยงต่อการตัดมดลูกฉุกเฉินในระยะคลอดบุตรจนถึง 24 ชั่วโมงหลังคลอด

ภรณัน จันทรเดิม, อภิชาติ จิตต์เจริญ, ณัฐพงศ์ อิศรางกูร ณ อยุธยา

วัตถุประสงค์: เพื่อศึกษาอุบัติการณ์และปัจจัยเสี่ยงต่อการตัดมดลูกฉุกเฉินในระยะคลอดบุตรจนถึง 24 ชั่วโมงหลังคลอด

วัสดุและวิธีการ: การศึกษาย้อนหลังแบบจับคู่ (Case-control study) ในหญิงตั้งครรภ์ที่คลอดในโรงพยาบาลรามาธิบดี ช่วงระหว่าง มกราคม พ.ศ. 2545 ถึง ธันวาคม พ.ศ. 2556 โดยกลุ่มศึกษา คือ หญิงตั้งครรภ์ที่มีอายุครรภ์ ตั้งแต่ 28 สัปดาห์ และได้รับการตัดมดลูกฉุกเฉินหลังจากคลอด ทั้งจากการคลอดทางช่องคลอด และการผ่าตัดคลอด กลุ่มควบคุม คือ หญิงตั้งครรภ์ที่คลอดก่อนและคลอดหลัง กลุ่มศึกษา โดยจับคู่เรื่องเวลาและวิธีการคลอด ข้อมูลได้จากเวชระเบียนที่ถูกรวบรวมและนำมาวิเคราะห์ ใช้การวิเคราะห์แบบถดถอยโลจิสติกพหุ, อัตราส่วนโอกาส (adjusted odds ratios (aOR)) และความเชื่อมั่น 95 เปอร์เซนต์ (confidence intervals (95% CI)) เพื่อค้นหาปัจจัยเสี่ยงที่สำคัญ

ผลการวิจัย: จากช่วงเวลาการศึกษาดังกล่าวพบว่า กลุ่มศึกษาที่ถูกตัดมดลูกฉุกเฉินหลังคลอดมีทั้งหมด 64 ราย จากหญิงตั้งครรภ์ที่คลอดทั้งหมด 48,970 ราย (1.31:1,000 การคลอด) และจากเวชระเบียนที่ข้อมูลครบถ้วน 60 รายนั้น ข้อบ่งชี้ของการผ่าตัดมดลูกฉุกเฉิน ได้แก่ ภาวะมดลูกหดตัวไม่ดี 29 ราย (48.3%) และ ปัจจัยจากรก 31 ราย (52.7%) โดยปัจจัยจากรก ได้แก่ ภาวะรกติดตึงร่วมกับรกเกาะต่ำ 15 ราย (25%), ภาวะรกเกาะต่ำ 9 ราย (15%), ภาวะรกติดตึง 5 ราย (8.3%), และภาวะรกลอกตัวก่อนกำหนด 2 ราย (3.3%) จากการวิเคราะห์แบบถดถอยโลจิสติกพหุ พบว่าปัจจัยเสี่ยงต่อการตัดมดลูกฉุกเฉินในระยะคลอดบุตรจนถึง 24 ชั่วโมงหลังคลอดที่สำคัญ คือ ภาวะมดลูกหดตัวไม่ดี (aOR = 170.7, 95% CI 42.1-692.7), ปัจจัยจากรก (aOR = 130, 95% CI 33.1-516.2) และน้ำหนักเด็กแรกคลอดมากกว่าเท่ากับ 4,000 กรัม (aOR = 12.4, 95% CI 1.6-93.7)

สรุป: อุบัติการณ์ของปัจจัยเสี่ยงต่อการตัดมดลูกฉุกเฉินในระยะคลอดบุตรจนถึง 24 ชั่วโมงหลังคลอด คือ 1.31:1,000 การคลอด ภาวะมดลูกหดตัวไม่ดี, ปัจจัยจากรก และน้ำหนักเด็กแรกคลอดมากกว่าเท่ากับ 4,000 กรัม เป็นปัจจัยเสี่ยงที่สำคัญต่อการตัดมดลูกฉุกเฉินในระยะคลอดบุตรจนถึง 24 ชั่วโมงหลังคลอด