Risk Factors of Primary Postpartum Hemorrhage in Siriraj Hospital

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ABSTRACT

Objective: To explore the risk factors of primary postpartum hemorrhage (PPH) in pregnant women who delivered at Siriraj Hospital.

Methods: The medical records of pregnant patients who delivered vaginally at Siriraj Hospital during January 1st to December 31st, 2005 were enrolled into 2 groups. The study group was singleton pregnancy with primary PPH and the control group was sandwich singleton pregnancies who delivered without PPH. The ratio between the study and the control group was 1:2. Baseline characteristics and obstetrics data of each group were collected. Descriptive statistics, independent sample t-test, odds ratio, 95% confidence interval and multiple linear regression analysis were used in this study.

Results: A total number of 222 medical records were reviewed. The number of the patients in the study group and control group were 74 and 148, respectively. By multiple linear regression analysis, the data revealed that prolonged third stage of labor and pregnancy induced hypertension were the significant risk factors related to primary PPH (P <0.05, 95%CI 0.2-0.65 and 0.01-0.47, respectively). The three most common causes of primary PPH in the study group were uterine atony (77.03%), birth passage injury (24.32%) and retained pieces of placenta (20.27%), respectively.

Conclusion: The significant risk factors of primary PPH in this study were prolonged third stage of labor and pregnancy induced hypertension. Uterine atony, birth passage injury and retained pieces of placenta were the next most common causes of primary PPH.

Keywords: Postpartum hemorrhage, risk factors, causes

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Primary postpartum hemorrhage (primary PPH) is defined as excessive bleeding from the vaginal tract after delivery of a child of more than 500 milliliters within the first 24 hours.[1,2] The associated risk factors and their severity increased with parity and duration of labor. It is an acute life threatening condition, but immediate management is life saving. Primary PPH is one of the most important causes of maternal death and accounts for 25 percent of all maternal deaths worldwide, especially in developing countries including Thailand.[3] In 2005, primary PPH occurred about 2.4% (209 cases out of 8,712 deliveries) at Siriraj Hospital.

It is a fact that all pregnant women are at risk of postpartum hemorrhage even though they have no risk factors.[3] However, identifying maternal risks for postpartum hemorrhage is still an important and useful key point in daily practice because a high risk pregnancy can then be closely monitored by a special team to modify their risk factors.[3] As a result, this may lead to a reduction of maternal morbidity and mortality.

Previous studies showed that there were many risk factors correlated with primary PPH. In practice, more than one factor could be found in the same pregnant woman and more risk factors brought greater chance of primary PPH.[4] The examples of these factors included advanced maternal age, prolonged second stage of labor, gestational diabetes, pregnancy induced hypertension, multiple gestation and uterine fibroid, etc.[5,6] This study aimed to find out significant risk factors of primary PPH in pregnant women who delivered at Siriraj Hospital between January 1st and December 31st, 2005 and the result from this study will lead to more appropriate care for pregnant women in PPH prevention.

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MATERIALS AND METHODS

This retrospective nested case control study has been approved by the Siriraj Institute Review Board (SIRB), and 8,712 inpatient medical records of pregnant women who delivered vaginally at the Department of Obstetrics and Gynaecology, Faculty of Medicine Siriraj Hospital, between January 1st and December 31st, 2005 were reviewed. Two hundred and twenty-two women were enrolled. The study population was divided into 2 groups: study group and control group.

The study group consisted of singleton pregnant women who were diagnosed as primary PPH. The sandwich singleton pregnancies who delivered without PPH before and after were put in the control group. This made the ratio between the women in the study group and control group in this study was 1:2. All enrolled cases were delivered vaginally (which included vacuum/forceps extraction and breech) and were of more than 28 weeks of gestation. Uterotonic agents, Oxytocin and/or Methylergonovine as indicated, were prescribed to all cases for prevention of primary PPH at the time of anterior shoulder delivery. Estimated blood loss was measured in milliliters by using the same standard container. The patients with cesarean delivery or incomplete data in medical records, especially missing information on risk factors, were excluded.

Topics of interest included baseline characteristics (age and pre-pregnancy BMI), obstetric data (parity and gestational age), peripartum data (complication during pregnancy: pregnancy, induced hypertension/chronic hypertension and/or diabetes mellitus etc), intrapartum data (use of anesthetic drug during labor, labor induction/augmentation, duration of three stages of labor and type of delivery), postpartum period (episiotomy wound and skill of operator), causes of primary PPH, pregnancy outcome and complications after delivery. Descriptive statistical analysis was used for baseline characteristics of the study population. Independent samples t-test, odds ratio with 95% confidence interval and multiple linear regression analysis were used to compare statistical difference between groups. P value of less than 0.05 signified statistical significance.

RESULTS

A total number of 222 inpatient singleton pregnant women who delivered at Siriraj Hospital were enrolled. The number of patients in the case and control group was 74 and 148, respectively. Table 1 revealed baseline characteristics of both groups. The mean ages of cases and control were 27.3 ± 6.6 and 26.5 ± 5.6 years, respectively. The mean pre-pregnancy body mass index (BMI) were 21.6 ± 3.4 and 21.5 ± 3.3 kg/m^2, respectively. The mean gestational ages at birth were 38.7 ± 2.1 and 38.3 ± 3.2 weeks' gestation. The mean infant birth weights were 3,150.5 ± 502.4 and 3028.5 ± 405.7 g, respectively. These parameters revealed no statistical difference between groups. Only estimated blood loss showed significant difference between the case and control group (662.8 ± 211.5 and 200 ± 71.2 ml, respectively, P <0.05).

Table 2 showed factors associated with primary PPH. Twelve factors were identified by univariate logistic regression analysis, but only three were found to have contributed to a significantly increased risk of PPH. Those were: pregnancy induced hypertension (OR 3.7, 95%CI 1.29-10.61), use of anesthetic agents during labor (OR 1.96, 95%CI 1.11-3.46) and prolonged third stage of labor (OR 7.67, 95%CI 2.41-24.47), P<0.05. Other factors including age (OR 2.41, 95%CI 0.94-6.23), pre-pregnancy BMI (OR 0.77, 95%CI 0.37-1.63 and OR 0.90, 95%CI 0.41-1.96 for underweight and overweight, respectively), parity (OR 1.09, 95%CI 0.62-1.91), gestational diabetes (OR 1.52, 95%CI 0.33-6.98), induction or augmentation of labor (OR 0.87, 95%CI 0.42-1.79), type of delivery (OR 1.51, 95%CI 0.58-3.93), episiotomy wound (OR 2.44, 95%CI 0.85-7.02), operator (OR 1.52, 95%CI 0.73-3.17 and 1.63, 95%CI 0.85-3.14 for medical/or nurse student and midwife, respectively) and prolonged second stage (OR 2.76, 95%CI 0.60-12.68) did not significantly increase the risk of primary PPH in this study. Furthermore, there was also no significant difference in perinatal asphyxia between groups (OR 2.01, 95%CI 0.12-32.65).

Using multiple linear regression analysis, Table 3 revealed that only prolonged third stage of labor and pregnancy induced hypertension were associated with an increased risk of primary PPH (P<0.05, 95%CI 0.2-0.65 and 0.01-0.47, respectively). For the cases of primary PPH, the three most common causes which were diagnosed by doctors on duty were uterine atony (77.03%), birth passage injury (24.32%) and retained pieces of placenta (20.27%). Blood transfusion was needed in 17.57% of cases. Only one case developed hypovolumic shock. Medication for promoting uterine contraction was prescribed in all cases and there was no peripartum hysterectomy noted in this study.

DISCUSSION

The main purpose of obstetric care is to save all pregnant women's lives and deliver healthy babies. The reduction of maternal mortality is the goal of the public health policy in every country. Primary PPH is a leading cause of maternal deaths, accounting for one-quarter of the maternal deaths worldwide and more than half in some developing countries, for example, Indonesia, Philippines and Guatamala.[3] Therefore, prevention and proper management of this condition is an important issue in daily practice.

Compared with previous studies, many risk factors of primary PPH in pregnant women who delivered vaginally were identified. For example, past history of PPH, second stage labor >60 min, forceps delivery, and incomplete placenta/ragged membranes were presented to be risk factors in the case control study performed in Australia, as well as a study in Nigeria,

TABLE 1. Baseline characteristics of the study population (222 cases).

	Case (N=74) Mean (SD)	Control (N=148) Mean (SD)	P value
Age (Year)	27.3 (6.6)	26.5 (5.6)	0.38
Pre-pregnancy BMI (kg/m^2)	21.6 (3.4)	21.5 (3.3)	0.8
Gestational age (weeks' gestation)	38.7 (2.1)	38.3 (3.2)	0.34
Estimated blood loss (ml)	662.8 (211.5)	200 (71.2)	0.000*
Infant birth weight (g)	3150.5 (502.4)	3028.5 (405.7)	0.05

*statistical significance: P value < 0.05

TABLE 2. Factors associated with postpartum hemorrhage.

	Case (N=74) N (%)	Control (N=148) N (%)	Odds ratio (95%CI)
Maternal age (years)			
≤ 35	64	139	1
> 35	10	9	2.41 (0.94-6.23)
Pre-pregnancy BMI (kg/m^2)			
18.5-24.9 kg/m^2	48 (64.86)	102 (68.92)	1
<18.5 kg/m^2	14 (18.92)	23 (15.54)	0.77 (0.37-1.63)
> 24.9 kg/m^2	12 (16.22)	23 (15.54)	0.90 (0.41-1.96)
Parity			
Parity = 0	32 (43.24)	67 (45.27)	1
Parity ≥ 1	42 (56.76)	81 (54.73)	1.09 (0.62-1.91)
Pregnancy induced hypertension			
No	64 (86.49)	142 (95.95)	1
Yes	10 (13.51)	6 (4.05)	3.7 (1.29-10.61)*
Gestational diabetes			
No	71 (95.95)	144 (97.30)	1
Yes	3 (4.05)	4 (2.70)	1.52 (0.33-6.98)
Use of anesthetic drug during labor			
No	37 (50)	98 (66.22)	1
Yes	37 (50)	50 (33.78)	1.96 (1.11-3.46)*
Induction/augmentation of labor			
No	14	25	1
Yes	60	123	0.87 (0.42-1.79)
Type of delivery			
Vaginal delivery	66 (89.19)	137 (92.57)	1
Assisted vaginal delivery	8 (10.81)	11 (7.43)	1.51 (0.58-3.93)
Episiotomy wound			
≤ 2nd degree	66 (89.19)	141 (95.27)	1
> 2 degree	8 (10.81)	7 (4.73)	2.44 (0.85-7.02)
Operator			
Resident/staff	28 (37.84)	41 (27.70)	1
Medical/nurse student	18 (24.32)	40 (27.03)	1.52 (0.73-3.17)
Midwife	28 (37.84)	67 (45.27)	1.63 (0.85-3.14)
Prolonged 2nd stage			
No	70 (94.59)	145 (97.97)	1
Yes	4 (5.41)	3 (2.03)	2.76 (0.60-12.68)
Prolonged 3rd stage			
No	61 (82.43)	144 (97.30)	1
Yes	13 (17.57)	4 (2.70)	7.67 (2.41-24.47)*
Perinatal asphyxia (Apgar score < 7 at 5 min)			
No	73	147	1
Yes	1	1	2.01 (0.12-32.65)

*statistical significant

which found prolonged second and third stages of labour and non use of oxytocin were risk factors of PPH.[7,8] Because of differences in study population, setting of studies and methodology, our study revealed only prolonged third stage of labor and pregnancy induced hypertension as risk factors of primary PPH; while the other factors, such as prolonged second stage, instrument assisted vaginal delivery and birth passage injury, were not identified as risk factors. Some data, such as prior history of PPH and retained pieces of placenta, were not presented in our study population; therefore nothing could be concluded about them. Moreover, further study should be done with regard to some rare conditions, e.g. multifetal pregnancy, uterine fibroid, fetal macrosomia and prolonged pregnancy, which might correlate to primary PPH.

However, similar to a previous study in Thailand, a longer duration of the third stage of labor was reflected in a greater amount of blood loss after delivery and was the strongest risk factor of primary PPH.[9] In 2009,

TABLE 3. Logistic regression analysis of factors associated with postpartum hemorrhage.

	Beta	Std error	P value	95%CI
Prolonged 3rd stage of labor	0.422	0.115	0.000*	0.2-0.65
Pregnancy induced hypertension	0.242	0.118	0.042*	0.01-0.47
Use of anesthetic agent during labor	0.120	0.062	0.055	- 0.003-0.24

*statistical significance: P value < 0.05

the Society of Obstetricians and Gynecologists of Canada recommended active management of the third stage of labor for prevention of PPH and stated that such management should be offered to all pregnant women.[10] This procedure reduced the duration of the third stage of labor, and therefore it could also reduce risk of primary PPH.

Magnesium sulfate is a drug of choice in management of pregnancy induced hypertension especially preeclampsia.[11] However, because this drug has an effect on relaxing of the myometrium, the major side effect of using this medication is PPH.[12,13] Although a previous study did not find an increased risk of PPH while using this drug,[14] our study revealed a different outcome; it increased the risk of PPH in pre-eclamptic women who were treated with magnesium sulfate (OR 3.7, 95%CI 1.29-10.61). Therefore, intensive care and close monitoring of these women are recommended to prevent the incident of primary PPH.

Concerning the causes of primary PPH, there was no difference between our study and the others. Uterine atony was still the leading cause of primary PPH and the others were birth passage injury and retained pieces of placenta.[15] Blood transfusion was also required in almost one-fifth of primary PPH cases; therefore, appropriate preparation of blood components was one factor which all obstetricians should be concerned with.

This study had some limitations. Firstly, because this was a retrospective study, not all risk factors of primary PPH were included. However, this study can be a starting point of future research on postpartum hemorrhage in our institute. Secondly, even though estimated blood loss was calculated by a standard fixed collecting container, it might still be underestimated because of incomplete blood collection from clothes, the collecting device and the placenta after delivery, depending on operators' procedure. However, this method was still better than visual estimation of blood loss which is more unreliable. Development or creation of a device which could accurately collect all blood loss should be considered in the future plan.

CONCLUSION

The significant risk factors of primary PPH in this study were prolonged third stage of labor and pregnancy induced hypertension. Uterine atony, birth passage injury and retained pieces of placenta were the next most common causes of primary PPH.

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