—Report on Experiments and Clinical Cases—

Risk Factors for Postpartum Hemorrhage after Vaginal Delivery of Twins

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Abstract

We examined vaginal deliveries of twins to identify factors most strongly associated with the increased risk of postpartum hemorrhage (estimated blood loss ≥ 1,000 mL). We reviewed the obstetric records of all 171 twin vaginal deliveries at Japanese Red Cross Katsushika Maternity Hospital from January 2002 through August 2006. Of these deliveries, 41 (24%) were complicated by postopartum hemorrhage. Postpartum hemorrhage was significantly more likely in cases with gestational age ≥ 39 weeks (odds ratio [OR], 3.47; 95% confidence interval [CI], 1.65–7.28), a combined birth weight of more than 5,500 g (OR, 2.53; 95% CI, 1.00–6.45), induction of labor (OR, 2.87; 95% CI, 1.38–5.98), oxytocin administration during labor (OR, 2.86; 95% CI, 1.27–6.48), or a duration of labor ≥ 24 hours (OR, 2.55; 95% CI, 1.15–5.62). Postpartum hemorrhage is a frequent complication in twin pregnancies. Therefore, special attention should be given after birth to patients with induction of labor or intervened delivery especially at ≥ 39 weeks' gestation.

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Key words: twin pregnancy, postpartum hemorrhage, advanced gestational age, induction of labor

Introduction

In deliveries of twins, overdistention of the uterus may weaken the contraction and retraction of the uterine muscles and increase the risk of postpartum hemorrhage[1]. The average blood loss during vaginal delivery of twins has been reported to be 935 mL and is greater than that during delivery of a single fetus[2]. Thus, both active management and careful observation are needed during the third stage of labor in twin pregancies. However, the potential risk factors for postpartum hemorrhage in twin births have not been thoroughly examined. In this case-control study, we examined vaginal deliveries of twins to identify the factors most strongly associated with an increased risk of postpartum hemorrhage.

Materials and Methods

We reviewed the obstetric records of all twin vaginal deliveries at Japanese Red Cross Katsushika Maternity Hospital form January 2002 through August 2006. Cases with cesarean section for one

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twin only, with the death of one fetus, or with a retained placenta were excluded from this analysis. In our hospital, the guidelines for vaginal delivery of twin pregnancy without severe complications are (1) vertex presentation of the first twin, (2) gestational age at delivery ≥ 33 weeks, and (3) estimated birth weight of at least 1,500 g for each twin. During this period, elective cesarean section was performed if patients showed twin-twin transfusion syndrome (polyhydramnion-oligohydramnion sequence) , monochorionic-monoamniotic twin pregnancies, or a history of previous cesarean deliveries. Labor was induced with informed consent in 75 patients (44%) on the basis of the appropriate date of delivery in multifetal pregnancies reported by Minakami et al.[3] In our hospital, we do not administer epidural anesthesia for vaginal deliveries. When arrest of dilation or descent, according to Friedman, lasting 2 hours occurred during the active phase of labor, oxytocin (intravenous administration at an initial dosage of 1 to 2 mU/minute) or amniotomy were used. Usually, the placenta was extracted by controlled cord traction. In addition, all patients received a rapid venous infusion of 5 U of oxytocin in 500 mL of lactated Ringer's solution following placental delivery to prevent postpartum hemorrhage.

Blood loss during vaginal delivery was calculated by collecting and measuring the blood in collection devices used specifically for vaginal birth and then weighing sheets, drapes, and sponges after delivery. Demographic information and the characteristics of labor were extracted from patient charts. Severe perineal laceration was defined as either third- or fourth-degree laceration. Neonatal asphyxia was defined by an Apgar score < 7 at 1 minute. In this study, postpartum hemorrhage was defined as estimated blood loss ≥ 1,000 mL based on a previous large study by Magann et al.[4].

Demographic information and the characteristics of labor were extracted from patient charts. In this study, potential risk factors for postpartum hemorrhage in twin pregnancies were selected according to previous studies of postpartum hemorrhage in singleton pregnancies[4–8]: maternal age; parity, chorionicity, gestational age at delivery, presentation of the second twin, induction of labor, intertwin delivery-time interval, number of placentas, and history of infertility, preeclampsia, premature rupture of membranes, instrumental delivery, perineal laceration, duration of labor, and dystocia or postpartum hemorrhage in twin pregnancies[1,2,9].

Statistical Analysis

Cases and controls were compared by means of Student's *t*-test for continuous variables, and χ^2 or Fisher's exact test for categorical variables. Odds ratios (ORs) and 95% confidence intervals (CIs) were also calculated. Differences with $P < 0.05$ were considered significant. Variables used in the multivariate model were those that on univariate analysis had shown marginal significance ($P < 0.3$) toward association with increased risk of postpartum hemorrhage. Logistic regression was then performed to identify the factors most strongly associated with postpartum hemorrhage in a multivariate model.

Results

During this period, there were 171 vaginal deliveries of twin pregnancies. The average postpartum blood loss in these deliveries was 675 ± 452 g. Postpartum hemorrhage (estimated blood loss ≥ 1,000 mL) was diagnosed in 41 (24%) of these deliveries. In addition, 6 patients (4%) received transfusions. The incidence of postpartum hemorrhage in twin pregnancies was significantly higher than that in singleton vaginal deliveries during this period (1.3%; 89 of 7,029 singleton pregnancies, $p < 0.001$).

Variable studies, analyzed by the incidence of postpartum hemorrhage, are summarized as continuous variables in **Table 1** and as dichotomous variables in **Table 2**. The incidence of postpartum hemorrhage was significantly greater in cases with a gestational age ≥ 39 weeks, a combined birth weight of more than 5,500 g, induction of labor, oxytocin administration during labor, or a duration of labor ≥ 24 hours.

Using logistic regression, the best model identified independent effects resulting from gestational age at

Table 1 Analysis of continuous variables by the incidence of postpartum hemorrhage

Postpartum hemorrhage	(−)	(+)	*P*-value
Number	130	41	
Maternal age (years)	29.1 ± 5.4	31.0 ± 6.0	0.058
Parity	0.6 ± 0.4	0.5 ± 0.4	0.16
Gestational age at delivery (weeks)	37.5 ± 2.0	38.3 ± 2.1	0.029
Duration of labor (hours)	6.1 ± 3.9	7.0 ± 4.3	0.21
Intertwin time interval (minutes)	16.1 ± 15	20.1 ± 17	0.15
Combined neonatal birth weight (g)	4,812 ± 654	5,056 ± 698	0.041

Data are presented as mean ± SD.

Table 2 Analysis of dichotomous variables by the incidence of postpartum hemorrhage

Postpartum hemorrhage	(−)	(+)	Crude OR	95% CI	*P*-value
Number	130	41			
Maternal age ≥ 35 years	31 (24%)	10 (24%)	1.03	0.45–2.34	0.94
Nulliparous	64 (49%)	22 (54%)	1.19	0.59–2.41	0.62
History of infertility	10 (8%)	6 (15%)	2.06	0.70–6.06	0.18
History of IVF	8 (6%)	6 (15%)	2.61	0.85–8.04	0.084
Preeclampsia	10 (8%)	4 (10%)	1.30	0.38–4.38	0.67
Monochorionic twins	45 (35%)	10 (24%)	0.61	0.27–1.35	0.22
Gestational age at delivery					
≤ 36 weeks	42 (32%)	11 (27%)	0.77	0.35–1.88	0.51
≥ 39 weeks	28 (22%)	20 (49%)	3.47	1.65–7.28	0.001
Vertex-vertex presentation	96 (73%)	34 (83%)	1.72	0.70–4.24	0.24
PROM	26 (20%)	10 (24%)	1.29	0.56–2.97	0.55
Induction of labor	49 (38%)	26 (63%)	2.87	1.38–5.98	0.003
Oxytocin use during labor	72 (55%)	32 (78%)	2.86	1.27–6.48	0.095
Vacuum/forceps delivery	21 (16%)	11 (27%)	1.59	0.90–2.83	0.19
Severe perineal laceration	0 (0%)	0 (0%)	0	—	1.00
Combined neonatal birth weight>5,500 g					
	13 (10%)	9 (22%)	2.53	1.00–6.45	0.046
Duration of labor<3 hours	24 (18%)	6 (15%)	0.76	0.29–2.00	0.57
≥ 24 hours	22 (17%)	14 (34%)	2.55	1.15–5.62	0.018
Intertwin time interval>30 minutes					
	22 (17%)	10 (24%)	1.58	0.68–3.70	0.29
One placenta	80 (62%)	21 (51%)	0.66	0.32–1.33	0.24

IVF, in vitro fertilization; PROM, premature rupture of the membrane.

Table 3 Final logistic regression model

Variables	Adjusted OR	95% CI
Gestational age at delivery		
37–38 weeks *	1.0	
≥ 39 weeks	4.29	1.77–10.35
Induction of labor		
No induction *	1.0	
Induction of labor	2.62	1.08–6.36

* Reference group

delivery ≥ 39 weeks and induction of labor (**Table 3**). In addition, the OR for postpartum hemorrhage with both induction of labor and delivery at ≥ 39 weeks was 5.77 (95% CI, 2.28–14.58; P = 0.00021).

Discussion

In this study, the incidence of postpartum hemorrhage of at least 1,000 mL during vaginal delivery of twins was 18-fold higher than that during a singleton delivery. Our findings support previous studies showing that multifetal pregnancy itself is a risk factor for postpartum hemorrhage[1,4].

In singleton pregnancies, risk factors for severe postpartum hemorrhage can be categorized as uterine atony or injury of soft tissue[5]. Previously reported risk factors for uterine atony include: induction of labor, prolonged labor, retained placenta, general anesthesia, the use of oxytocin, overdistention of the uterus due to multiparity, large fetus, or hydramnion[5–8]. In this study, although we could not examine the effects of retained placenta or hydramnion, which is associated with twin-twin transfusion syndrome, twin pregnancies that require induction of labor or use of oxytocin or both or that are complicated by prolonged labor or large fetuses might be expected to cause a failure of uterine contraction when labor ends. Thus, the present results suggest that the mechanisms leading to postpartum hemorrhage in twin pregnancies are similar to those in singleton pregnancies associated with uterine atony, such as large fetuses, induction of labor, and prolonged labor.

In this study, gestational age of at least 39 weeks was a risk factor for postpartum hemorrhage in twin pregnancies. The most appropriate gestational age for delivery of multifetal pregnancies, in terms of fetal and neonatal mortality, is supposedly 37 to 38 weeks[3]. Intrauterine growth in twins stops after 39 weeks, and placental weight reaches a plateau after 37 weeks' gestation[10,11]. The limitation of the maternal supply line is suggested to contribute to these growth patterns. Therefore, perinatal outcomes in multifetal pregnancies have been suggested to benefit from induction of labor at 37 to 38 weeks[3,12]. In the present study, there were no significant differences in neonatal prognostic variables between cases with and without postpartum hemorrhage. However, our findings suggest that the appropriate date of delivery in twin pregnancies is 37 to 38 weeks, in consideration of maternal outcomes.

In conclusion, postpartum hemorrhage is a frequent complication of twin pregnancies. Therefore, special attention should be given after birth to patients who have received induction of labor or intervened delivery especially at ≥ 39 weeks' gestation.

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