

## Elective Cesarean as a Risk Factor for Transfusion after Delivery of Twins

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### Abstract

We examined deliveries of twins to identify factors most strongly associated with an increased risk of transfusion. We reviewed the obstetric records of 511 twin deliveries at the Japanese Red Cross Katsushika Maternity Hospital from 2003 through 2007. After 18 (3.5%) of these deliveries, transfusions were required. Transfusion was significantly more likely after elective cesarean delivery at a gestational age of 37 weeks or more (odds ratio, 4.85; 95% confidence interval, 1.87–12.61). Emergency cesarean delivery (at  $\geq 37$  weeks' gestation) was not associated with an increased risk of transfusion. The delivery mode of twins should be carefully considered because of the increased risk of transfusion after elective cesarean delivery at a gestational age of 37 weeks or more.

(J Nippon Med Sch 2008; 75: 247–249)

**Key words:** twin pregnancy, transfusion, elective cesarean

In deliveries of twins, overdistention of the uterus may weaken the contraction and retraction of the uterine muscles and increase the risk of substantial blood loss<sup>1,2</sup>. However, the potential risk factors for transfusion due to hemorrhage in the delivery of twins have not been thoroughly examined. In this case-control study, we examined deliveries of twins to identify the factors most strongly associated with transfusion.

We reviewed the obstetric records of all twin deliveries at the Japanese Red Cross Katsushika Maternity Hospital from 2003 through 2007. Demographic information and the characteristics of labor were extracted from patient charts. Potential risk factors for transfusion due to hemorrhage after delivery of twins were selected according to previous studies of postpartum hemorrhage or

transfusion or both after delivery<sup>3-8</sup>: maternal age; parity, chorionicity, gestational age at delivery; and history of infertility, preeclampsia, premature rupture of membranes and mode of delivery in twin pregnancies.

Cases and controls were compared by means of Student's *t*-test for continuous variables, and the  $\chi^2$  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 transfusion. Logistic regression was then performed to identify the factors most strongly associated with transfusion in a multivariate model.

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Journal Website (<http://www.nms.ac.jp/jnms/>)

Table 1 Analysis of continuous variables by the incidence of transfusion

Transfusion	( - )	( + )	P-value
Number	493	18	
Maternal age (years)	32.3±5.3	33.1±5.0	0.53
Parity	0.5±0.4	0.6±0.4	0.31
Gestational age at delivery (weeks)	36.4±3.2	37.2±2.4	0.19
Combined neonatal birth weight (g)	4,640±741	4,911±658	0.11

Data are presented as mean ± SD.

Table 2 Analysis of dichotomous variables by the incidence of transfusion

Transfusion	( - )	( + )	Crude OR	95% CI	P-value
Number	493	18			
Maternal age ≥ 35years	127 ( 26%)	5 (28%)	1.11	0.39–3.17	0.85
≥ 40years	7 ( 1.4%)	1 (5.6%)	4.08	0.48–35.08	0.11
Nulliparous	326 ( 66%)	12 (67%)	1.02	0.38–2.78	0.96
History of infertility	108 ( 22%)	8 (44%)	2.85	1.10–7.40	0.025
History of IVF	91 ( 18%)	5 (28%)	1.70	0.59–4.89	0.32
Preeclampsia	40 ( 8.1%)	4 (22%)	3.24	1.02–10.29	0.036
Monochorionic twins	157 ( 32%)	6 (33%)	1.07	0.39–2.90	0.89
TTTS	3 (0.60%)	0 ( 0%)	0	—	0.74
Gestational age at delivery					
≤ 34weeks	63 ( 13%)	0 ( 0%)	0	—	0.11
≤ 36weeks	199 ( 40%)	10 (56%)	1.85	0.72–4.76	0.20
≥ 39weeks	51 ( 10%)	2 (11%)	1.08	0.24–4.85	0.92
PROM	62 ( 13%)	3 (17%)	1.39	0.39–4.94	0.61
Combined neonatal birth weight > 5,000g	140 ( 28%)	7 (39%)	1.60	0.61–4.22	0.33
Vaginal delivery	187 ( 38%)	3 (17%)	0.33	0.09–1.15	0.067
Cesarean delivery	306 ( 62%)	14 (78%)	2.21	0.72–6.80	0.16
Emergency cesarean	205 ( 42%)	4 (22%)	0.40	0.13–1.24	0.10
Emergency cesarean at ≥ 37weeks	67 ( 14%)	2 (11%)	0.79	0.18–3.53	0.76
Cesarean for one twin	8 ( 1.6%)	1 (5.6%)	3.57	0.42–30.14	0.21
Elective cesarean at term	101 ( 20%)	10 (56%)	4.85	1.87–12.61	< 0.001

IVF, in vitro fertilization; TTTS, twin-twin transfusion syndrome; PROM, premature rupture of membranes.

Table 3 Adjusted ORs for transfusion by maternal age and gestational age.

	N	OR	95% CI	P-value
Maternal age group				
< 35 years	12 (3.2%)	0.77	0.27–2.23	0.63
35–39 years	5 (4.2%)	1.00		
≥ 40 years	1 (1.4%)	3.80	0.38–37.85	0.22
Gestational age group				
≤ 36 weeks	10 (5.0%)	2.09	0.75–5.85	0.15
37–38 weeks	6 (2.5%)	1.00		
≥ 39 weeks	2 (3.9%)	1.61	0.32–8.23	0.56

During this period, there were 511 twin deliveries of twin pregnancies. After 18 (3.5%) of these deliveries, transfusion was required. The rate of transfusion after twin deliveries was significantly higher than that after singleton deliveries (0.64%; 60

of 9,306 singleton deliveries,  $p < 0.001$ ).

Variable studies, analyzed by the incidence of transfusion, are summarized as continuous variables in **Table 1** and as dichotomous variables in **Table 2**. **Table 3** summarizes the adjusted ORs for

transfusion by maternal age and gestational age. A history of infertility treatment (OR, 2.85; 95% CI, 1.10–7.40) or preeclampsia (OR, 3.24; 95% CI, 1.02–10.29) was associated with increased odds of transfusion. Transfusion was significantly more likely in cases of elective cesarean delivery at a gestational age of 37 weeks or more without labor pains (OR, 4.85; 95% CI, 1.87–12.61). However, transfusion cases and controls showed no significant difference in the following variables: emergency cesarean (p=0.10); emergency cesarean at a gestational age of 37 weeks or more (p=0.76); or Cesarean for one twin (p=0.21). With logistic regression, in addition, the best model identified independent effects resulting from elective cesarean delivery at a gestational age of 37 weeks or more without labor pains. The adjusted OR for transfusion with this condition was 2.71 (95% CI, 1.73–4.25;  $P < 0.001$ ).

Our results suggest that in twin pregnancies an elective cesarean delivery at a gestational age of 37 weeks or more without labor pains is an independent risk factor for transfusion after delivery. Our results also suggest that the mechanisms leading to increased blood loss after delivery of twins is associated with uterine atony without contraction<sup>1</sup>. On the other hand, vaginal or emergency cesarean delivery (at term) was not associated with an increased odds of transfusion. Recently, a marked increase in the overall cesarean delivery rate of twin pregnancies has been observed<sup>9,10</sup>. This increase is believed to be due to physician counseling and maternal request for elective cesarean delivery to avoid a combined vaginal-Cesarean delivery<sup>9,11</sup>. The risk of neonatal morbidity is increased for a second twin delivered via cesarean section after vaginal delivery of the first twin, especially at term<sup>11</sup>. Thus, the recent

tendency may be acceptable. However, the delivery mode of twins should be carefully selected because of the increased risk of transfusion after elective cesarean at a gestational age of 37 weeks or more (term).

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(Received, January 17, 2008)

(Accepted, May 7, 2008)