OBSTETRICS

Method of Placental Delivery and Postcesarean Endometritis

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ABSTRACT

Objective To determine manual removal vs. spontaneous separation of placenta with cord traction at cesarean section affects the rate of postcesarean endometritis.

Study design A randomized controlled trials, double-blinded study.

Setting Department of Obstetrics and Gynecology, Rajvithi Hospital, Bangkok, Thailand.

Subjects and Methods Pregnant women without medical and obstetric complications who underwent cesarean section were ramdomized into 2 groups before operation. The first group had the placenta removed manually, whereas the second group had the placenta separated spontaneously with cord traction.

Main outcome measure Postcesarean endometritis.

Result A total of 240 term- singleton were randomized into group 1 (N=112) and group 2 (N=128). The antepartum, intrapartum and intraoperative variables were comparable in both groups. The incidence of postcesarean endometritis was greater in the manual removal group, 12 of 112 (10.7%) than in the spontaneous separation with cord traction group, 3 of 128 (2.3%). The relative risk was 4.57 (95% confidence interval 1.32-15.79; p = 0.007). The mean hematocrit reduction at 24 hour postoperation were not statistically significant in both groups (a reduction of 4.3 ± 2.1 percent and 4.3 ± 2.3 percent; p = 0.870).

Conclusion Manual removal of placenta in cesarean section is associated with an increase in the incidence of postcesarean endometritis when compare to spontaneous separation. There is no difference in hematocrit reduction postoperatively.

Key words: cesarean section, placental delivery, postcesarean endometritis

The infection is the most complication associated with cesarean delivery.[1] The risk of endometritis after cesarean delivery is about eight-fold higher than after vaginal delivery.[2] The most important clinical risk factors for postcesarean endometritis are maternal age,[3-4] massive maternal obesity, higher body mass index, nulliparity, gestational age, preoperative remote infection, maternal preoperative condition, prolonged labor and ruptured membranes, the number of vaginal examination, type of anesthesia, type of operation, operative time, intraoperative groves change, exteriorization vs. in situ

repair of uterine incision, operative blood loss and surgical technique.[(1,5-13)] The method of placenta delivery is a factor associated with the risk of postcesarean endometritis and it has been reported by many investigators,[(12-15)] but the previously reported data have a relatively high rate of postcesarean endometritis with a statistically and clinically significant reductions in spontaneous placental delivery compared to manual removal of placenta. They also reported a statistically significant increasing of operative blood loss in the manual group compared to the spontaneous placental delivery group.[(15-17)] The purpose of this investigation is to determine whether the manual delivery of placenta is likely to increase in postcesarean endometritis, hematocrit reduction and operative blood loss when compare to spontaneous placental delivery.

Materials and Methods

This randomized controlled trial, double-blinded study was performed at Rajvithi Hospital, Bangkok, Thailand. The research proposal was approved by the Ethics Committee of Rajvithi Hospital. Written informed consent was obtained from all participants with term singletons in the latent phase or early active phase of labor, and only those who had obstetric indication for cesarean delivery were enrolled in the study. Hematocrit value was taken along with the matching/grouping process for packed red cells preparation before the operation. The patient was randomly assigned to one of two study groups by simple randomization. The study groups were as follow: 1) manual removal of the placenta 2) spontaneous delivery of the placenta with cord traction. We excluded patients with medical and obstetric complications, women with premature rupture of membranes whose antibiotics given for group B streptococcal prophylaxis, hematocrit less than 30% before operation and no placenta previa.

All operative procedures were performed according to the study protocol, by well-trained, second and third-year residents as the primary surgeon, the women's abdomen was first shaved, then scrubbed for 3-5 minutes with 1% providine-iodine scrub, and painted with 1% providine-iodine solution. The surgeons scrubbed for 3-5 minutes with either iodine or chlorhexidine solution. Foley catheter was retained in the operative room. The type of anesthesia was assigned accordingly to the anesthesiologist. Low midline incision was considered in all cases of primary cesarean section.

After delivery of the baby, the anesthesiologist routinely added 20 units of oxytocin to the intravenous fluid, while the surgeon applied the Green Ametage Forceps to the bleeding points of uterine incision and gentle uterine massaged for good contraction before delivery the placenta was attempted. In manual removal group, the surgeon's hand introduced into the uterine cavity to separate the placenta from the margin and delivered, whereas, in spontaneous placental separation group, gentle traction on the umbilical cord was used to assist delivery. After placental delivery, the uterine cavity was cleaned with a laparotomy swab wrapped around the surgeon's hand. We avoid the surgeon's hand in contamination with the uterine cavity and increase the risk of endometritis. A double layer closure of the uterine incision was routinely done. The outcomes of the study were assessed by the resident in charge without the knowledge of the method of placental delivered. All pregnant participants were blinded for the method of placenta delivery and were asked to stay for at least one week postoperatively until the abdominal wound were assessed.

Endometritis was defined as a puerperal fever and at least two of the following: uterine tenderness, foul-smelling lochia or leukocytosis (white blood cell count 15,000 - 30,000/mm^3).

Sample size calculation was based on the 80% power (=0.2) to detect the difference in postcesarean endometritis in the manual removal group and in the spontaneous placental delivery group from the pilot study, 10% and 2% respectively , with 95% confidence (= 0.05). Assuming a data loss rate of not more than 10 %, thus, a sample size needed to detect this one tailed effect was therefore 240.

Analysis was by intention to treat, using the Statistical Package for the Social Sciences (SPSS-for Windows). Statistical analysis included comparison of rates and calculation of relative risks (RR) and 95% confidence intervals (CI). For continuous variables, Student's t test were used, whereas for categorical variables, Chi-square test (^{2}) or Fisher's exact test were used where appropriate. Statistical significance was considered when p value < 0.05.

Results

During January 1[st.] and May 31[st.], 2002, a total of 240 term-singleton women were enrolled in the study; 112 women had manual removal of placenta, and 128 women had spontaneous placental delivery. Table 1 showed the comparable antepartum and intrapartum variables in both groups. The intraoperative and postpartum variables were also comparable and presented in table 2. Emergency cesarean section accounted for 140 of 240 (58.3%). Of these, 63 of 112 (56.3%) was in manual removal group and 77 of 128 (60.2%) was in spontaneous delivery group.

Table 3 showed the outcome variables, postcesarean endometritis occurred in 12 / 112 (10.7%) women who had manual removal of placenta and 3 / 128 (2.3%) women with spontaneous delivery. The relative risk was 4.57 with 95% confidence interval 1.32-15.79; p = 0.007 and risk reduction of 78.5%. Subgroup analysis of emergency cesarean delivery (N=140) also revealed the higher incidence of endometritis in manual removal group than in the spontaneous delivery group, 8/112 (12.7%) and 3/128

(3.9%) respectively. The relative risk was 3.26 (95% confidence interval 0.92 -11.77; p = 0.054). Whereas, in the subgroup of elective cesarean section (N =100), the incidence of endometritis in the manual removal group was 4/112 (8.2%) and there was no endometritis in the spontaneous delivery group. Therefore, type of cesarean section and event of postcesarean endometritis was further analysed. The incidence of endometritis in the emergency group was higher than in the elective group (7.5% and 4%) but not reach statistical significance. The relative risk was 1.96 (95% confidence interval 0.64 -5.99; p = 0.172).

The incidence of wound dehiscence was higher in the manual group than in the spontaneous group, 4/112 (3.6%) and 1/128 (0.8%) respectively but not reach the statistically significant. The relative risk was 4.57 (95% confidence interval 0.52-40.30; p=0.146). All cases of wound dehiscence were in emergency cesarean section subgroup. There was no significant difference in mean operative blood loss and mean hematocrit reduction at 24 hour postoperation between the two groups, $4.3 \pm 2.1\%$ and $4.3 \pm 2.3\%$ respectively (p = 0.870). There was one case of visual estimation of blood loss of 1,700 ml. due to further uterine tear in the manual removal group and two units of packed red cells transfused, she was excluded in the analysis of hematocrit reduction at 24 hour. The maximum time from child birth to placental delivery in manual removal and spontaneous delivery groups were four and five minutes respectively. There was no case of method failure in this study.

Table 1. Comparison of antepartum and intrapartum variables

Variables	Method of placental removal	
	Manual removal N = 112	Cord traction N = 128
Age (yr.)	28.6 ± 5.6	27.5 ± 5.8
Gestational age (wk.)	39.0 ± 1.4	38.9 ± 1.5
Hematocrit before operation (%)	36.6 ± 2.8	36.9 ± 3.1
Body weight at cesarean section (Kg)	67.6 ± 10.3	68.1 ± 10.0
Total weight gain (Kg)	15.8 ± 6.6	16.3 ± 6.9
Elective cesarean section (N=100)	49 (43.8%)	51 (39.8%)

Variables	Method of placental removal	
	Manual removal N = 112	Cord traction N = 128
Emergency cesarean section (N = 140)	63 (56.2%)	77 (60.2%)
Oxytocin use (%)	20 (31.7%)	21 (27.3%)
Analgesic drug use (%)	13 (20.6%)	16 (20.8%)
Duration of labour (hr)	7.2 $\pm$ 4.7	6.3 $\pm$ 3.8
Duration of membranes rupture (hr)	4.7 $\pm$ 4.6	4.9 $\pm$ 4.7
Number of pelvic examination	3.7 $\pm$ 2.6	3.8 $\pm$ 2.5
Indication for cesarean section (%)		
Previous C/S	49 (43.8%)	51 (39.8%)
CPD	36 (32.1%)	46 (35.9%)
Malpresentation	14 (12.5%)	17 (13.3%)
Non reassuring FHR/IUGR	13 (11.6%)	11 (8.6%)
Infertile / Elderly primigravida	3 (2.3%)	-

Table 2. Comparison of intraoperative and postpartum variables

Variables	Method of placental removal		P value
	Manual removal N = 112	Cord traction N = 128	
Total operative time (min)	57.5 $\pm$ 12.8	57.0 $\pm$ 15.2	0.817
Performed by Resident 2	100 (89.3%)	120 (93.8%)	0.524
Resident 3	12 (10.7%)	8 (6.3%)	
Type of anesthesia			
General	58 (51.8%)	68 (53.1%)	0.190
Regional	54 (48.2%)	60 (46.9%)	
Time from child birth to placental delivered (min)	1.3 $\pm$ 0.6 range 1-4 min	1.4 $\pm$ 0.6 range 1-5 min	0.638
Birth weight (gm)	3178.6 $\pm$ 418.1	3196.5 $\pm$ 407.6	0.738
Placental weight (gm)	629.2 $\pm$ 130.3	642.1 $\pm$ 121.6	0.428
Visual estimation of blood loss (ml)	542.4 $\pm$ 256.0	534.8 $\pm$ 240.0	0.812
Hematocrit at 24 hr (%)	32.4 $\pm$ 3.6	32.6 $\pm$ 3.7	0.660

Table 3. Comparison of postoperative outcomes

Variables	Method of placental removal		RR (95% CI**)	P value
	Manual removal N = 112	Cord traction N = 128		
Postcesarean endometritis	12 (10.7%)	3 (2.3%)	4.57 (1.32-15.79)	0.007
In elective section	4 (8.2%)	-		
In emergency section	8 (12.7%)	3 (3.9%)	3.26 (0.90-11.77)	0.054
UTI	2 (1.8%)	1 (1.3%)	-	

Variables	Method of placental removal		RR	P value
	Manual removal N = 112	Cord traction N = 128	(95% CI**)	
Wound dehiscence *	4 (3.6%)	1 (0.8%)	4.57 (0.52-40.30)	0.146
Hematocrit reduction (%)	4.3$\pm$2.3	4.3$\pm$2.1	-	0.870

*All cases in emergency cesarean section group   ** CI = Confidence interval

Discussion

Because maternal morbidity and mortality are higher in cesarean delivery than vaginal birth.[1,18] and the cesarean rate is not expected to decrease in the near future, techniques that reduce morbidity rate are important to identify. Recent studies suggested the method of placenta delivery after child birth may play an important role in the occurence of postcesarean endometritis.[15-17]

Our study revealed an increase in postcesarean endometritis rate in manual removal group, which confirm the previous studies of Atkinson et al,[12] Lasey et al[14] and McCurdy et al.[15] Most of the postcesarean endometritis in our study were in the emergency cases, we also found more in the manual removal group. Interestingly, our study also showed no difference in the operative blood loss, as well as the more objective measurement, the hematocrit reduction at 24 hour postoperation, between the two methods of placental delivery. This might be our study protocol to pay an attention on gentle uterine massage before the attempt to remove the placenta either manual or cord traction. We also put on uterine clamps to the incision where necessary. Furthermore, we routinely added 20 units of oxytocin to the intravenous fluid immediately after child birth to make good uterine contraction. However, the mean blood loss was higher than that reported by Angsuwathana S,[16] but less than the other studies.[15,17] This is possible the bias in visual estimation which may not be accurate as the others. We had no method failure in this study, since we had neither abnormal placental adherence nor abnormal cord insertion in our studied population which may affect the external validity of the study in term of successful of the method. However, these problems were found very little and the study sample is not big enough to detect them.

Finally,we would like to conclude that manual removal of placenta at cesarean section carries a higher incidence of postcesarean endometritis than spontaneous delivery of placenta, especially in emergency cases. No difference in visual estimation of blood loss and hematocrit reduction at 24 hour postoperation.

Acknowledgement

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