

Controlled cord traction versus minimal intervention techniques in delivery of the placenta: A randomized controlled trial

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Controlled cord traction versus minimal intervention techniques in delivery of the placenta: A randomized controlled trial

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OBJECTIVES: Our purpose was to compare the controlled cord traction technique with the minimal intervention technique for delivery of the placenta. The primary outcome was the incidence of postpartum hemorrhage. Secondary outcomes included duration of third stage of labor, frequency of retained placenta, hemorrhagic shock, the need for blood transfusion, and the need for uterotonic agents to control postpartum hemorrhage.

STUDY DESIGN: A total of 1648 women who were delivered vaginally were randomly allocated during labor to the controlled cord traction group ($n = 827$) or the minimal intervention group ($n = 821$). In the controlled cord traction group women received oxytocin, 10 units intramuscularly, with delivery of the baby's anterior shoulder, after which the placenta was delivered actively by controlled cord traction (Brandt-Andrews method). In the minimal-intervention group the placenta was delivered by maternal pushing. Continuous intravenous oxytocin was given after delivery of the placenta. Odds ratios with 95% confidence intervals were calculated for each variable.

RESULTS: The overall incidence of postpartum hemorrhage was significantly lower in the controlled cord traction group (5.8% vs 11%; odds ratio 0.50, 95% confidence interval 0.34 to 0.73). The incidence of retained placenta (≥ 30 minutes) was 1.6% in the controlled cord traction group and 4.5% in the minimal intervention group (odds ratio 0.31, 95% confidence interval 0.15 to 0.63). Significantly more patients in the minimal intervention group required additional uterotonic agents to control hemorrhage (5.1% vs 2.3%; odds ratio 0.44, 95% confidence interval 0.24 to 0.78).

CONCLUSION: The controlled cord traction technique for delivery of the placenta results in a significantly lower incidence of postpartum hemorrhage and retained placenta, as well as less need for uterotonic agents, compared with the minimal intervention technique. (Am J Obstet Gynecol 1997;177:770-4.)

Key words: Third stage of labor, controlled cord traction, postpartum hemorrhage, retained placenta

More women die from accidents of the third stage of labor than during the other two stages combined. The cause of death is usually postpartum hemorrhage. The World Health Organization estimates that about 500,000 women die every year from causes related to childbirth.¹ About 99% of deaths occur in the developing world. Lessening the likelihood of postpartum hemorrhage by routine management of the third stage of labor could play an important role in reducing maternal morbidity and mortality.

Although most authorities agree that the use of oxytocic agents is valuable in the reduction of blood loss during the third stage, the timing of administration varies among institutions and among countries. In the United States delivery of the placenta is achieved in a more physiologic fashion. After delivery of the fetus the attending obstetrician awaits the signs of separation of the placenta. The patient is then encouraged to push the placenta, and no traction is applied to the cord. After delivery of the placenta, administration of oxytocin in dilute intravenous infusion is then used to contract the uterus. In a survey of Canadian obstetricians, Baskett² reported that 52% of responding physicians practiced active management of the third stage of labor and administered oxytocin at delivery of the fetus and before delivery of the placenta. In a similar survey Philips and Kinch³ reported that 92% of Texas obstetricians use oxytocics routinely after delivery of the placenta. In addition, only 15% used oxytocics before delivery of the

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placenta, and 5.2% used no oxytocic agents. In the United Kingdom, Ireland, Australia, Asia, and Africa, active management of the third stage of labor is advocated, with administration of intramuscular oxytocin during delivery of the anterior shoulder; placental delivery is then achieved with a controlled cord traction method.⁵⁻⁷

In view of the above-described controversies and inconsistencies in the method of management of third-stage labor, we designed this prospective randomized trial to compare the controlled cord traction technique (most popular method) with the minimal intervention technique (most commonly recommended in the United States) for delivery of the placenta. The primary outcome was the frequency of postpartum hemorrhage.

Material and methods

The study was performed between January and June 1995 at the Comiche Hospital, Abu Dhabi, United Arab Emirates. Active management of the third stage of third labor was routinely done in all vaginal deliveries conducted in this hospital. The study was approved by the ethics committee of the hospital. All patients who consented to participate and were expected to deliver vaginally were eligible to enter the trial. The principal criteria for exclusion were refusal to participate or the need for emergency cesarean section in labor.

On admission to the labor ward, patients who were expected to deliver vaginally were randomly allocated to either the controlled cord traction group or the minimal intervention group by assigning a numbered sealed opaque envelope. Each envelope carried the instructions to manage the third stage of labor either with controlled cord traction or minimal intervention. Before delivery, during the second stage of labor, the envelope was opened by the midwife-obstetrician attending the delivery. A patient was excluded from the trial, after entry, only if cesarean section was required for any reason in the second stage of labor. All patients for whom an envelope was opened were deemed to have entered the trial and were followed up regardless of subsequent management.

Controlled cord traction technique. Patients allocated to the controlled cord traction group had the third stage of labor managed actively. Oxytocin (10 units) was administered intramuscularly during delivery of the anterior shoulder of the baby. In the case of breech vaginal delivery this was given soon after delivery of the baby. The umbilical cord was clamped and cut immediately after delivery of the baby. As soon as the baby was separated and palpation of the uterus through a sterile abdominal towel confirmed that it was contracting firmly, controlled cord traction was commenced (Brandt-Andrews technique). The lower segment of the uterus was grasped between the thumb and index finger, and

steady pressure was exerted in an upward and backward direction. At the same time the other hand, holding the clamp on the cord, at the level of the introitus started steady traction on the cord in a backward and downward direction, exactly countered by the upward pressure of the hand on the uterus, so that the position of the uterus remained unchanged. The traction was gentle at first and then was slowly increased, the placenta usually being delivered quite easily. Controlled cord traction was repeated every 2 to 3 minutes, if the first attempt was unsuccessful. No fundal pressure was applied to the abdomen even if the placenta failed to deliver by the controlled cord traction method.

Minimal intervention technique. Each patient allocated to the minimal intervention group had the placenta delivered physiologically. After delivery of the fetus the umbilical cord was clamped and cut. No traction was applied to the cord and no massage or fundal pressure was practiced. The uterine fundus was examined to assure that it was firm. Signs of separation of the placenta were awaited; these included a gush of blood from the vagina, descent of the umbilical cord, or an increase in the height of the uterus in the abdomen as the lower uterine segment was distended by the placenta. After separation, the placenta, the cord, and the membranes were delivered by maternal expulsive efforts. After delivery of the placenta, oxytocin, 10 units in 500 ml of normal saline solution, was given in a slow intravenous infusion.

Measurement of blood loss. Blood loss was measured by the attendant midwife or obstetrician by collecting all blood and clots in a graduated jug and weighing swabs and linen. A second midwife, who was not aware of the group allocation and not involved in the delivery, was then called to confirm the amount of blood loss to remove unintentional bias. The inherent inaccuracy of the traditional method of estimating blood loss is recognized, but the design of the trial attempted to assure that the potential bias was equal in both arms. Postpartum hemorrhage was defined as blood loss of ≥ 500 ml. A sample of venous blood (5 ml) was obtained 2 days after birth for hemoglobin and hematocrit estimation from each patient, as an objective index of blood loss.

Retained placenta and its manual removal in both groups. Blood was not drained out of the cord before delivery in either group. The placenta was considered retained if not delivered within 30 minutes after fetal expulsion. A few minutes later further attempts were made to deliver the placenta by cord traction, digitally or with the help of ring forceps. Intravenous infusion of oxytocin, 20 units in 500 ml of saline solution, was begun if bleeding had started. Manual removal of the placenta was performed with the patient under regional or general anesthesia, 60 minutes after delivery of the baby, unless heavy bleeding compelled earlier intervention.

Table I. Maternal characteristics at trial entry

	Controlled cord traction (n = 827)	Minimal intervention (n = 821)
Maternal age (yr, mean)	28.2	27.8
Gestational age (wk, median)	39.8	40
Nulliparous women	205 (24.8%)	210 (25.6%)
Grand multiparous women (para \geq 5)	126 (15.2%)	120 (14.6%)
Obstetric history		
Postpartum hemorrhage	10 (1.2%)	9 (1.1%)
Retained placenta	9 (1.1%)	8 (1.0%)
Induction of labor	106 (12.8%)	101 (12.3%)
Oxytocin augmentation	89 (10.8%)	90 (11.0%)
Preeclampsia	45 (5.4%)	47 (5.7%)
Multifetal gestation	11 (1.3%)	10 (1.2%)
Polyhydramnios	5 (0.6%)	4 (0.5%)
Breech vaginal delivery		

Sample size calculations. The sample size calculations showed that at least 771 patients would be required in each study group to detect a decrease in the risk of postpartum hemorrhage by 40% with a power of 80% and significance set at 5%. This sample size assumed an incidence of postpartum hemorrhage of 10% with the minimal intervention technique and 6% with the controlled cord traction technique. These incidences were based on data from the literature in the same population and on preliminary data by the senior author (G.Q.K.) revealing a 6% incidence with the controlled cord technique. For statistical analysis the odds ratio with 95% confidence interval was calculated with the Student *t* test for continuous variables and χ^2 for parametric and nonparametric categorized factors.

Data collection. In the labor ward the relevant trial information was recorded on a data sheet by the midwife supervising the delivery. All data sheets were collected by the ward clerk and kept ready for analysis once the trial was complete. Additional information for comparability of the trial population was extracted from the labor ward computer and manually from individual medical record folders.

Outcomes of the trial. The primary outcome was the incidence of postpartum hemorrhage. The secondary outcomes included duration of the third stage of labor, frequency of retained placenta, frequency of hemorrhagic shock, the need for blood transfusions, and the need of methylergonovine or 15-methyl- α -prostaglandin to control postpartum hemorrhage.

Results

During the 6-month trial period, 4239 patients were delivered of their infants in this hospital. Of these, 1657 patients were recruited and were randomly allocated to either the minimal intervention group ($n = 825$) or the controlled cord traction group ($n = 832$). Nine patients (minimal intervention, $n = 4$, and controlled cord traction, $n = 5$) were excluded from the trial after randomization,

because they underwent cesarean section in the second stage of labor and no longer met the inclusion criteria. After exclusion, 821 patients in the minimal intervention group and 827 patients in the controlled cord traction group were available for analysis. Table I shows that the two groups were comparable in terms of parity, gestational age, labor induction or stimulation rate, hypertension in pregnancy, multifetal gestation, polyhydramnios, vaginal breech delivery, and history of retained placenta or postpartum hemorrhage. Table II shows that labor outcomes were similar in terms of spontaneous delivery, forceps or vacuum delivery, median duration of first and second stages of labor, and frequency of episiotomies or tears. Table III shows that there was no significant difference in the neonatal outcome in terms of shoulder dystocia and birth weight. Table IV compares the primary outcome results. The incidences of overall postpartum hemorrhage and hemorrhage \geq 1000 ml were significantly lower in the controlled cord traction group. The median blood loss was 200 ml in the controlled cord traction group and 250 ml in the minimal intervention group. Table V shows the secondary outcomes. The incidence of retained placenta of \geq 30 minutes' duration was significantly lower in the controlled cord traction group. More patients in the minimal intervention group required blood transfusion (minimal intervention, $n = 4$, and controlled cord traction, $n = 1$), and significantly more patients in the minimal intervention group required methylergonovine or 15-methyl- α -prostaglandin to control blood loss. However, the results of retained placenta (\geq 60 minutes), shock, and need for blood transfusion did not reach significance because of the small sample size in both groups.

Comment

Postpartum hemorrhage may lead to significant maternal mortality and morbidity, particularly in the developing world.⁷ The most common cause of postpartum hemorrhage is usually either uterine relaxation or atony,

Table II. Labor outcome

	Controlled cord traction (n = 827)	Minimal intervention (n = 821)
Variables in labor		
Spontaneous onset of labor	686 (83%)	675 (82%)
Spontaneous vertex delivery	687 (83%)	678 (82.5%)
Forceps and vacuum delivery	29 (3.5%)	30 (3.6%)
Median duration of labor		
First stage (hr)	4.5	4.7
Second stage (min)	10	12
Chorioamnionitis	8 (1.0%)	6 (0.7%)
Episiotomy	193 (23.35%)	197 (24%)
Perineal tears		
Second degree	120 (14.5%)	113 (13.8%)
Third- or fourth-degree	2 (0.24%)	2 (0.24%)

Table III. Neonatal outcome

	Controlled cord traction (n = 827)	Minimal intervention (n = 821)
Shoulder dystocia	4 (0.51%)	4 (0.48%)
Mean birth weight (gm)		
≤2500 gm	29 (3.5%)	26 (3.2%)
≥4000 gm	65 (7.8%)	58 (7.0)

Table IV. Primary outcome

Postpartum hemorrhage	Controlled cord traction (n = 827)	Minimal intervention (n = 821)	Odds ratio and 95 % confidence interval
Total	48 (5.8%)	90 (11%)	0.50 (0.34-0.73)
≥1000 ml	6 (0.72%)	26 (3.16%)	0.22 (0.08-0.57)

Table V. Secondary outcomes

	Controlled cord traction (n = 827)	Minimal intervention (n = 821)	Odds ratio and 95 % confidence interval	Significance
Retained placenta				
≥30 min	12 (1.58%)	37 (4.5%)	0.31 (0.15-0.63)	
≥60 min	3 (0.36%)	9 (1.1%)	0.33 (0.07-1.32)	
Third-stage labor duration (min, mean ± SD)	4 ± 2.5	14 ± 2.5		p < 0.001
Change in hematocrit (mean ± SD)	2 ± 1.2	8 ± 1.7		p < 0.001
Blood transfusion (No.)	1	4	0.25 (0.01-2.33)	
Methylergonovine or 15-methyl- α -prostaglandin	19 (2.3%)	42 (5.1%)	0.44 (0.24-0.78)	
Shock	2 (0.24%)	8 (0.97%)	0.25 (0.04-1.25)	

or both, which underscores the importance of management of the third stage of labor to prevent such a complication. The optimal method for the management of the third stage of labor remains a subject of controversy.⁷⁻¹¹ In general, there is universal agreement that the administration of oxytocin after delivery of the baby reduces the risk of postpartum hemorrhage by about 40%.¹⁰ However, there is no agreement regarding the method to be used for management of the third stage of labor. Currently, the two most widely used methods are

the controlled cord traction technique and the physiologic minimal intervention technique. The first method includes the administration of oxytocin after delivery of the fetal shoulder (before delivery of the placenta), whereas the latter technique includes the administration of oxytocin after delivery of the placenta.

The findings of our trial reveal that the controlled cord traction method for management of the third stage of labor resulted in a significantly lower incidence of postpartum hemorrhage (both ≥500 ml and ≥1000 ml) compared with

the minimal intervention method. Moreover, the number of women requiring additional uterotonic agents to control hemorrhage (methylergonovine, 15-methyl- α -prostaglandin) was significantly lower in the controlled cord traction method. It remains unclear which component of the controlled cord traction method was responsible for this benefit. Soriano et al.¹¹ recently compared the frequency of postpartum hemorrhage in women receiving oxytocin either immediately after delivery of the head or after expulsion of the placenta. They found that the administration of oxytocin immediately after delivery of the fetal head was associated with a significant reduction in the incidence of postpartum hemorrhage. Thus the difference in postpartum hemorrhage found in our study may be related to the timing of oxytocin administration rather than to the technique. Nevertheless, our findings are in agreement with their results.

The use of the controlled cord traction method was reportedly associated with a significant reduction in the duration of the third stage of labor, as well as in the frequency of retained placenta beyond 30 minutes. We found that women whose deliveries were managed with the controlled cord traction method had a significantly shorter third stage of labor (4 minutes vs 14 minutes) and a lower incidence of retained placenta beyond 30 minutes (1.6% vs 4.5%). These findings expand on and support the results of previous authors.

A major drawback of the controlled cord traction method is the concern about giving intramuscular oxytocin before delivery of the placenta to a woman with undiagnosed twin gestation. In our study, in which all patients received prenatal care and had routine ultrasonographic examinations during pregnancy we encountered no such cases. Nonetheless, this possibility should be considered in other populations in which routine ultrasonographic examinations may not be available.

In summary, the results of several previous studies, as well as those of our trial, indicate that active management of the third stage of labor by means of the controlled cord traction technique is highly effective in preventing postpartum hemorrhage.

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