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Management of Third Stage of Labor: A Comparison of Intraumbilical Oxytocin and Placental Cord Drainage

Somayeh Makvandi ^{1*}, Shirin Zargar Shoushtari ², Vahideh Zaker Hosseini ³

¹Islamic Azad University Ahvaz Branch, Ahvaz, IR Iran

² Ahvaz Jundishapur University of Medical Sciences, Ahvaz, IR Iran

³Arvand International Division, Ahvaz Jundishapur University of Medical Sciences, Apadana Hospital, Ahvaz IR Iran

* Corresponding Author: Somayeh Makvandi, Department of Midwifery, Faculty of Nursing and Midwifery, Ahvaz Branch, Islamic Azad University, Golestan Blvd, Ahvaz, IR Iran, Tel: +98-9166042247, Fax: +98-6113348351, E-mail: Somayemakvandi@gmail.com

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Abstract

Introduction: Postpartum hemorrhage is an important cause of maternal morbidity and mortality. There are some active and physiologic methods for management of third stage of labor. This study is aimed to evaluate and compare the efficacy of intraumbilical vein injection of oxytocin and placental cord drainage in the management of third stage of labor.

Methods: In this prospective clinical trial, 152 women received 20 ml of a 0.9% saline solution with either 20 units of oxytocin injected in the umbilical vein after clamping (Group A, n = 51), placental cord drainage (Group B, n = 50) or no intervention (Group C, n = 51). The primary outcome was mean duration of third stage of labor.

Results: The third stage of labor was significantly shorter in group A and B as compared to group C (3.50, 3.54 vs. 5.16min, P = 0.001). There were no reports of need for manual removal of placenta or retained placenta.

Conclusion: The use of intraumbilical injection of oxytocin and placental cord drainage in the third stage of labor significantly reduced the duration of the third stage.

Key words: Intraumbilical oxytocin; placental cord drainage; third stage of labor

Introduction

The third stage of labor is the duration from the birth of the baby to the delivery of the placenta. During the third stage of labor complications are common and can threaten the mother's life. The most common complication is postpartum hemorrhage, which remains a leading cause of maternal mortality, especially in developing countries (1). A prolonged third stage of labor is often associated with increased hemocratic morbidity and therapeutic interventions (2). There are two quite different approaches to the clinical management of the third stage: Active management and expectant management. Active pharmacologic management of the third stage of labor is common today and has resulted in a significant decrease in early and late postpartum hemorrhage and in total maternal peripartum mortality and morbidity (3, 4). It involves the use of oxytocin or methylergometrine intravenously or intramuscularly after shoulder delivery, controlled cord traction once the uterus is contracted and uterine massage to prevent postpartum hemorrhage (5). One of these methods is the administration of oxytocin via the umbilical vein for the delivery of placenta. Umbilical vein oxytocin injection directs treatment to the placental bed and

uterine wall, resulting in earlier uterine contraction and placental separation (6). Several studies and systematic reviews have been published on the use of intraumbilical oxytocics, but these studies assessed the use of intraumbilical oxytocin for the treatment of retained placenta (7-11). However, limited published literature is available evaluating the effect of umbilical vein oxytocin injection in routine practices for active management of the third stage of labor (2, 12, 13).

In contrast, expectant management involves waiting for signs of separation and allowing the placenta to deliver spontaneously or aided by gravity or nipple stimulation. Expectant management is also known as conservative or physiological management and is popular in some northern European countries and in some units in the USA and Canada. It is also the usual practice in domiciliary practice in the developing world (14). One of or physiological management is cord drainage. Cord drainage in third stage of labor involves unclamping the umbilical cord and allowing the blood from the placenta to drain freely into appropriate receptacles (15). The results of the studies in this area are varied and sometimes contradictory (15-17).

The present study is aimed at studying and comparing the effectiveness of intraumbilical oxytocin and placental cord drainage in the management of third stage of labor.

Material and Methods

This is a prospective clinical trial that carried out in Razi hospital in Ahvaz, Iran, during the period from September till December 2012. The trial included primigravid women between 18-35 years of age with normal pregnancy, a singleton fetus at a gestational age of 37 - 42 weeks in a cephalic presentation, neonatal birth weight of 2500 to 4500 grams, and having normal labor followed by normal vaginal birth. Exclusion criteria were medical disorders and hypertensive disorders of pregnancy, mothers in advanced first stage of labor (> 6 cm cervical dilatation) on admission, intrauterine fetal death and oxytocin induction or augmented cases.

A preliminary power analysis was carried out to calculate the sample size using a formula: $d = \Delta/SD$, where d is standardized difference, Δ is the smallest clinically significant difference and SD is standard deviation of the test group. Duration of 1.6 minutes was considered as the smallest clinically significant difference, and the SD

(1.6 minutes) was selected from the study performed by Gu'ngördu'k et al. (18). Also, a standardized difference of 1.0 was obtained using nomogram (19). The power analysis suggested that a sample of 50 women in each group would provide a power of 95%, at 5% significance.

All participants were recruited from the antenatal clinic of our hospital after they had received information on the purpose and course of the study from the medical investigator and had provided the written consent during routine prenatal visits. The 152 study participants were divided into three groups using simple random sampling technique. After monitoring the duration of active phase and second stage of labor by following the partograph, in the labor room women in Group A ($n = 51$) received intraumbilical vein injection oxytocin 20 units diluted in 20 ml of 0.9% saline solution immediately after delivery of the baby, clamping and cutting the cord. The women in Group B ($n = 50$) had placental drainage immediately after delivery. This scenario included, placental cord clamping and cutting after delivery of the baby followed by immediately unclamping of the maternal side, allowing the blood to drain freely. The women in Group C ($n = 51$) as a control group received no intervention. The

placenta was delivered by controlled cord traction after appearance of clinical signs of placental separation, which include strong uterine contraction, vaginal bleeding, and descending of umbilical cord through the vulva. Retained placenta was defined as a placenta that remained in the uterus for 30 minutes or more after delivery. Duration of the third stage of labor, retained placenta and need for manual removal of placenta were recorded.

Data were then analyzed with SPSS, version 16.0. Mean and standard deviation of continuous variables were calculated using descriptive statistics. Continuous variables were analyzed by ANOVA and Tukey tests.

A p value less than 0.05 was indicated statistical significance.

Results

The findings of this clinical trial showed that the three groups were matched for baseline maternal and neonatal characteristics as shown in Table 1. Mean of third stage duration had a significant difference between study groups (Table 2). Tukey test showed that women in group A and B had a significantly shorter third stage than group C with p value of 0.0001 (Table 3). There were no reports of need for manual removal of placenta or retained placenta.

Table 1. Baseline Characteristics of Study Groups

Characteristics	Group A (n = 51)	Group B (n = 50)	Group C (n = 51)	P value
Age (yr)	25.60 ± 4.81	25.94 ± 6.73	26.50 ± 6.33	0.87
Gestational age (wk)	38.70 ± 1.16	38.74 ± 1.96	38.56 ± 1.14	0.65
1st stage duration (min)	229.03 ± 59.68	267.96 ± 67.33	244.01 ± 62.73	0.87
2nd stage duration (min)	52.45 ± 18.27	55.33 ± 23.85	49.72 ± 16.93	0.66
Newborn weight (gr)	3362.63 ± 737.53	3385.98 ± 542.87	3394.17 ± 803.11	0.51

Data are mean ± standard deviation.

Table 2. Study Outcome of Groups

Group	Third stage duration (min)	P value
Group A	3.50 ± 0.97	0.0001 ^a
Group B	3.54 ± 0.91	
Group C	5.16 ± 1.13	

Data are mean ± standard deviation.

^a p value is significant.

Table 3. Tukey multiple comparison of study groups

	Group (I)	Group (J)	Mean Difference (I-J)	Std. Error	P value
Tukey HSD	Group A	Group B	-0.01471	0.40499	1.000
		Group C	-2.55152 ^a	0.44402	0.0001 ^a
	Group B	Group A	0.01471	0.40499	1.000
Group C		-2.53681 ^a	0.39323	0.0001 ^a	
Group C	Group A	2.55152 ^a	0.44402	0.0001 ^a	
	Group B	2.53681 ^a	0.39323	0.0001 ^a	

^a p value is significant.

Discussion

Uterine atony is the most important and common cause of postpartum hemorrhage and it can be prevented by proper management of third stage of labor. The use of oxytocics immediately after the delivery of the baby is one of the most important interventions to prevent blood loss postpartum (13). A few trials have investigated the routine use of intraumbilical oxytocin with active management of the third stage of labor (12, 13, 18, 20).

Nazarpour managed 60 women with 10 units of oxytocin diluted in 10 ml saline given through umbilical vein immediately after cord clamping and 60 controls, received no intervention (21). The author reported significant reduction in duration of third stage of labor (4.45min vs. 6.93min) in intraumbilical group as compared to control. Similarly, Kore et al. in 2000, injected 100 patients with 10 units of oxytocin in 20 ml of saline and 100 controls with intravenous

oxytocin (12). Mean duration of third stage in study group was 5.6 ± 3.2 min which was statistically less than 10.2 ± 2.8 min in control ($P < 0.01$).

On the contrary, Ojha and Malla in 2007 randomly assigned 120 women to two groups: women assigned to the 1st group had 10 units oxytocin diluted in 10 ml saline injected directly in the umbilical vein whereas those assigned to the 2nd group received 10 units oxytocin intramuscularly (13). They reported that intraumbilical oxytocin had no added benefit either in decreasing the duration of third stage of labor (3.6 ± 1.5 min in the 1st group and 3.7 ± 1.3 min in the 2nd group, $P = 0.60$). They believe that this disagreement may be related to larger newborn weight (3025 vs. 2875.8 g, $P = 0.03$) in the intraumbilical group. Another speculation is lower amount of normal saline used 10ml in the study vs. 20ml in other researches which is less effective in facilitating placenta separation.

It seems that intraumbilical Oxytocin reaches the placental bed and stimulates uterine contractions, thus decreasing the area of the placental attachment site. The resulting tension causes the decidua spongiosa to give way with the formation of a hematoma. This accelerates the process of placental separation and expulsion, thus resulting in a shorter duration of the third stage of labor and a probably smaller amount of blood loss (22). The hydraulic effect of injected solution may also contribute to placental separation by mechanical pressure (2).

The results of this study showed that placental cord drainage can reduce the third stage duration when compared to control group. It has been suggested that placental cord drainage may boost delivery of the placenta by reducing its bulkiness and permitting the uterus to better contract and retract (23).

The Cochrane database of systemic reviews studied the effect of placental cord drainage on the third stage of labor (15). They selected the randomized trials involving placental cord drainage as a variable within the package of intervention as part of the management of the third stage of labor and concluded that cord drainage results in statistically significant reduction in the

length of the third stage of labor. Sharma et al reported a study on 958 women having vaginal delivery, who were randomized to the drainage method (478 women) or controlled cord traction method (480 women) for placental delivery (16). The mean duration of third stage of labor was 3.24 minutes and 3.2 minutes in the placental drainage group in contrast to 8.57 min and 6.2 min in controlled cord traction method in primigravida and multigravida respectively.

Results of Taebi et al. study showed that the frequency of a third stage longer than 6 minutes was higher in patients who had cord drainage that is in contrast to our results (17). This issue may be due to the gestational age of study participants that were between 33 to 42 weeks. However the authors tried to modified the effect of gestational age on third stage duration and changed this variable to a qualitative variable (< 37 weeks and 37 weeks \leq), but it should be noted that duration of third stage of labor increases with reduction of gestational age in preterm labors. Findings of Combs and Laros study confirm this statement (24). They showed that duration of third stage of labor in gestational age of 32 to 35 weeks is significantly longer than 36

weeks or more with p value less than 0.0005.

Most of the previous studies involved both primigravid and multigravid women, which could be problematic in labor trials, whereas our study involved primigravid only that this is its strength (2, 13, 16, 17). One limitation of the study is the relatively small sample size for looking at parameters such as retained placenta.

Conclusion

In conclusion, the present study demonstrated that the use of intraumbilical injection of oxytocin and placental cord drainage significantly reduced the duration of the third stage. These methods save the parturient of the adverse systemic effects of parentally administered oxytocic agents and spares the obstetrician or midwife of the anxiety and dependence on availability of an extra person at the time of delivery (2). Larger studies are necessary to confirm these findings.

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