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The Effect of the Timing of Intramuscular Oxytocin Injection on Maternal Bleeding during the Third Stage of Labour

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ABSTRACT

Background & aim: The third stage of labour is one of the most troublesome stages of child delivery. The basic principle of the third stage management is administrating prophylactic uterotonics. However, the time of its administration varies in different hospitals. This study aimed to determine the effect of intramuscular oxytocin injection after emergence of the fetal anterior shoulder or placental expulsion on bleeding in the third stage of labour.

Methods: This clinical trial was conducted on 100 pregnant women with gestational age of 38-42 weeks, and singleton pregnancies. Subjects were selected using convenience sampling and were then randomly assigned to intervention (injection of 10 IU intramuscular oxytocin after emergence of the fetal anterior shoulder) and control (injection of 10 IU intramuscular oxytocin after placental expulsion) groups. Blood was collected in containers and weighed with a weighing scale. A checklist was used to record labor and delivery related data. Data were analyzed by SPSS version 11.5, using Chi-square and t-test.

Results: The mean amount of bleeding during the third stage of labour was 183.4±145.8 and 202.2±208.8 ml in intervention and control group, respectively. No significant difference was found between two groups in terms of maternal bleeding.

Conclusion: Injection of intramuscular oxytocin either after emergence of the fetal anterior shoulder or placental expulsion does not affect the amount of maternal bleeding during the third stage of labour.

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Introduction

The third stage of labour is a critical stages of child delivery (1). Post-partum hemorrhage is one of the most important factors responsible for maternal mortality, and majority of women will be at risk, if it is not properly managed (2). It is estimated that 9 out of 14 deaths are related to postpartum hemorrhage and one third of maternal mortality in Asia and Africa is associated with post-partum hemorrhage. Moradan et al. reported that post-partum hemorrhage is the most common cause of maternal death, and is also responsible for 50% of maternal mortality rate in Iran (3). Active management of the third stage of labour is an evidence-based strategy for decreasing the incidence of uterine atony and post-partum hemorrhage. It can reduce the need for blood transfusion, and the administration of other uterotonics (5); it also decreases post-partum hemorrhage by 60% (4).

One of the most essential elements of third stage management is oxytocin administration (6). It decreases the incidence of post-partum hemorrhage by 40%-50%, either before or after placenta delivery (4, 7). It is recommended that 10 IU oxytocin be administered intramuscularly,

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as the first step of bleeding prevention (8). However, the time of injection varies in different hospitals (3, 6). Some researchers believe that oxytocin administration, before placental delivery, reduces the amount of bleeding (7, 9).

For the delivery of anterior shoulder, oxytocin is commonly administered in almost two-thirds of UK maternity units (4); however, the process can be quite risky. If Oxytocin are given before delivery of the placenta, however, they may entrap or death an undiagnosed, undelivered second twin. Most studies indicated that the third stage of labour could be properly managed, without drug administration, and cause very little bleeding in low-risk vaginal deliveries (10).

Soltani et al. reviewed 3 experimental studies which were conducted on 1,671 women. They aimed to analyze the effect of oxytocin with two different doses and using two administration methods, for the management of the third stage of labour. They concluded that there is no evidence regarding the advantage of oxytocin administration, before placental delivery (6). Some researchers recommend prophylactic oxytocin administration, after birth of the baby and before placental delivery, in order to decrease third stage duration and bleeding (7); some researchers suggest the standard method for oxytocin administration after placental delivery (10).

Although maternal morbidity and mortality rates are reduced with the standard management of the third stage of labour, controversial strategies applied in different countries, raise various questions in this regard. The evidence is quite limited regarding the administration time of uterotonics, and the instructions for managing the third stage of labour are insufficient; therefore, gynecologists and midwives still need a large body of information and clinical trials. This study was conducted in order to determine the effect timing of oxytocin intramuscular injection on bleeding during the third stage of labour.

Materials and Methods

This clinical trial was conducted in the maternity unit of 9th Day Hospital, Torbat-e Heydarieh. Ethical considerations were followed by receiving permission from the hospital authorities, and obtaining informed consents from the participants. The sample size method of experimental studies was used, and 45 participants were enrolled. The confidence interval was considered as 95%, and power as 80%. Disregarding the treatment dropouts, 55 subjetcs were assigned to each group (experimental and control groups), and therefore the final sample size was calculated as 110.

Convenience sampling method was applied and the participants were randomly allocated to each group. Even and odd numbers were randomly assigned to subjects who met the inclusion criteria: even numbers (1) for those in the experimental group (oxytocin administration after the emergence of the anterior fetal shoulder), and odd numbers (2) for the subjects in the control group (oxytocin administration after the expulsion of placenta).

The inclusion criteria were as follows: the age range of 18-35 years old; Full- term singleton pregnancy with a living fetus; normal delivery with cephalic presentation; referral for pregnancy care before 20th week of pregnancy, and through the whole period.

The subjects were excluded if they met the following criteria: the history of curettage; cesarean section; surgery on the uterus; hyperdistension of the uterus; precipitous or prolonged labour; chorioaminiotitis; maternal chronic diseases such as diabetes mellitus, hypertension, renal diseases, and endocrine, pulmonary or neurologic conditions during pregnancy; third trimester bleeding; taking oxytocin and utrolytics (Magnesium sulfate, Halothane , ritodrine); being under epidural or spinal anesthesia during the first or second stage of labour; history of post-partum hemorrhage; infant's birth weight of less than 2500 gr or more than 4000 gr; episiotomy and lacerations of the birth canal.

Confounding variables were controlled by matching the patients' various characteristics e.g. age, gravidity, parity, the length of the first and second stages of labour, mechanism of placental expulsion, birth weight, and placenta weight.

Data were collected via a demographic questionnaire, which consisted of 7 questions regarding the subject's age, education, occupation, number of deliveries, and menstrual

Table 1. Distribution of participants in two study groups, regarding the mechanism of placental expulsion

Groups	Intervention		Control		*P*
	N	%	N	%	
Mechanism					
Schultze	47	94	43	86	0.317
Duncan	3	6	7	14	
Total	50	100	50	100	

condition. The checklist was used to collect the data, concerning the first, second and third stages of labour, the patient's vital signs before and after delivery, and the mechanism of placenta delivery. A Sinker was used for the collected blood samples, infant's birth weight and placenta weight.

In order to assess the validity and reliability of the questionnaire, content validity and inter-rater reliability were applied; also a 500gr Sinker was utilized for confirming the scale reliability. After selecting the subjects and obtaining the informed consents, the questionnaires were completed by doing interviews, and the checklists were filled by observing the participants from the time of their admission to the end of the second stage of labour. The experimental group had an intramuscular injection of 10 IU oxytocin (manufactured by Aburaihan Pharmaceutical Company), immediately after the anterior fetal shoulder emerged. The control group received 10 IU oxytocin (manufactured by Aburaihhan Pharmaceutical Company), intramuscularly, right after the placental delivery.

In both groups, the neonatal umbilical cord was clamped immediately after birth (when the signs and symptoms of placental abruption were observed); the placenta was removed by Brandt-Andrews maneuver in both groups. After the newborn delivery, a sterile container was placed under the parturient for collecting blood samples from the time of child birth until the placental delivery. Then blood was collected and since one gram ia equal to one ml, blood volume has been expressed in terms of ml.

Systolic and diastolic blood pressure and the pulse rate of women were monitored during the first stage and 15 min after placental delivery.

Data were analyzed by SPSS version 11.5, using chi-square and t-test. Confidence intervals are calculated 95%.

Table 2. Comparison of the mean of placental and neonatal weights in the intervention and control groups

Groups	Intervention	Control	*P*
Variables			
Placenta weight(gr)	98.1±603.8	81.1±575.6	0.120
neonatal weight(gr)	3179±359.7	3172±320.3	0.918

Results

The mean age of women was 27.5±4.73 years in the experimental, and 27.4±4.97 years in the control group; based on t-test results, no significant difference was found between the groups (*P*=0.96). Of all participants, more than 98% were housewives (*P*=0.98), and 66% of the experimental, and 62% of the control group were multigravida 2-4; chi–square test showed no significant difference regarding the number of pregnancies in the two groups (*P*=0.89). More than 80% of the participant had gestational age of 40 weeks, and no significant difference was observed among them (*P*=0/99). Also, the two groups showed no significant difference concerning the mechanism of placental expulsion (*P*=0.317) (Table 1), placenta weight (*P*=0.120) and birth weight (*P*=0.918) (Table 2).

Based on t-test results, systolic blood pressure and pulse rate after delivery (*P*=0.826, *P*=0.22, respectively) and diastolic blood pressure (*P*=0.14) were not significantly different among the groups (Table 3).

As to the findings, the mean amount of bleeding in the third stage of labor was

Table 3. Comparison of the mean blood pressure, and pulse rate, before and after childbirth, in the intervention and control groups

Variables	Intervention		Control		P-value	
	before childbirth	after childbirth	before childbirth	after childbirth	before childbirth	after childbirth
Systolic blood pressure (mmHg)	114±11.2	106±14.1	112±9.3	107±132	0.629	0.826
Diastolic blood pressure (mmHg)	71.2±8.0	69±8.0	69.4±7.1	72±7.1	0.237	0.140
pulse rate (rate/min)	77±7.1	85.5±7.3	79±7.1	88.2±10.7	0.137	0.220

Table 4. Comparison of the third stage bleeding in the intervention and control groups

Groups	Intervention		Control		T-test
	N	%	N	%	
amount of bleeding					
۱۵۰mL≤	41	82	40	80	
151-300 mL	7	14	8	16	
301-500 mL	2	4	2	4	
> mL 500	1	2	4	8	
Total amount (ML) Mean (SD)	183.4±145.8		202.2±208.8		*P*=0.600

183.4±148.8 ml, and 202.2±208.8 ml in the experimental and control groups, respectively; therefore, the results indicate no significant difference (*P*=0.600) (Table 4).

Discussion

The two groups showed no significant difference in terms of third stage hemorrhage. An evidence-based research reviewed 3 experimental studies conducted on 1,671 women, who were under the third stage management of labour via different doses and methods of oxytocin administration. Researchers observed no significant effect of oxytocin before or after placental delivery on bleeding, during the third stage of labour or after it (6). Johnoten et al. (2011) reported a significant difference of bleeding between the group which received oxytocin and the one which received none (P<000.1) during the third stage of labour. In the mentioned study, oxytocin injection in the third stage of labour decreased the bleeding after delivery (11).

Although in the present study, placental delivery was assisted by Brandt-Andrews Maneuver, the study by Johnsten et al. did not use such methods. In the present study, both groups were administered oxytocin, however, they received it at different times (after the emergence of anterior fetal shoulder, and placenta delivery for the experimental and control groups, respectively).

Puri et al. performed a randomized prospective study on 125 primigravidas, and they were assigned to 4 groups; 3 groups received oxytocin 10 IU, 20 IU, and 30 IU in 50 ml normal saline (NS), and the control group received just 50 ml NS which was injected in the umbilical cord after delivery. They concluded that oxytocin groups have less bleeding in comparison with the control group, and the most reduced level was related to the group receiving oxytocin 30 IU, which was injected intramuscularly after fetal delivery (1). Their study was only conducted on primiparous females with episiotomy or lacerations of the birth canal. Hence, discrimination between third stage bleeding and bleeding by episiotomy and lacerations of the birth canal is not possible.

The management of post-partum hemorrhage in the third stage of labour is a crucial step toward preventing maternal morbidity and mortality (12). Several researchers support prophylactic administration of oxytocin, after the child birth and before placenta delivery, in order to decrease third stage duration and the amount of blood loss (9). Some studies showed the effect of oxytocin injection on decreasing bleeding incidence by 40% after delivery, regardless of the injection time (13). Johnsten et al. (2011) suggested that prolonged third stage of labour and the placenta weight are among the risk factors for third stage hemorrhage (11). In the present study, no significant difference was found between the groups, considering the placenta weight (Table 2). Other confounding variables such as the mechanism and maneuver of placenta delivery (10, 14) were similar in the two groups.

As to the findings, the means of systolic and diastolic blood pressure, and pulse rate were not significantly different among the groups. According to Kestent, intravenous oxytocin has hypotensive effects (14); however Jago et al. studied the effect of oxytocin on blood pressure and reported that oxytocin infusion has no effect on blood pressure (13). Puri et al. suggested that intramuscular oxytocin does not decrease blood pressure (1). As to the findings of the present study, oxytocin injection during the third stage causes no change in blood pressure. Similar studies on blood pressure and pulse rate which used two distinct methods indicated no significant difference in bleeding.

Limitations

The limitation of the present study was undiagnosed uterine disorders, which could cause fibrosis or adhesion of the placenta to the uterus, and increase third stage bleeding. Although this study is not double-blind, the researchers tried to decrease the errors by also the variables of the subjects to each group were

controlled, and valid and reliable instruments were applied. In this study, the two groups showed no significant difference in terms of third stage bleeding; however, further studies are required to investigate early and late Post-partum hemorrhage and Hb, Hct (hemoglobin and hematocrit) in pre/post delivery, also the neonatal .outcomes.

Conclusion

Based on the findings of this study, the injection time of oxytocin has no effect on third stage bleeding.\. As to the findings of the current study, it seems that oxytocin injection, after placenta delivery, is safer and less risky.

Conflict of Interest

No conflict of interest exists.

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