

Effect of Different Doses of Intraumbilical Oxytocin on Third Stage of Labor

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ABSTRACT

Objectives: A prospective randomized study was conducted from May 2012 to April 2014 at the Department of Obstetrics and Gynecology, Dr. Sushila Tiwari, Memorial Government Hospital and Government Medical College, Haldwani. Its aim was to study and compare the effects of different doses of intraumbilical oxytocin on 3rd stage of labor with respect to duration and amount of blood loss.

Materials and methods: The study comprised 200 antenatal cases and included patients with singleton pregnancies at term and spontaneous onset of labor while excluding those with medical disorders of pregnancy, antepartum hemorrhage (APH), multiple pregnancy, polyhydramnios, chorioamnionitis, severe anemia, Rh negative pregnancy, pregnancy-induced hypertension (PIH), prior cesarean delivery, and forceps or ventouse application during delivery. History and examination was taken in each patient before delivery and hemoglobin and hematocrit were noted before and after delivery. Progress of labor was monitored and each patient was randomized into one of the four groups according to the dose of oxytocin to be given.

Results: Increasing doses of oxytocin resulted in decrease in duration of 3rd stage of labor and amount of blood loss.

Conclusion: Third stage of labor and amount of blood loss significantly reduced by increasing the dose of oxytocin to 30 IU.

Keywords: Intraumbilical, Labor stage, Oxytocin.

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INTRODUCTION

The third stage of labor is the time from the birth of baby to the expulsion of the placenta and membranes. Postpartum hemorrhage (PPH) is the leading cause of direct maternal mortality and mortality accounting for at least one-quarter of maternal deaths worldwide.¹

Postpartum hemorrhage can be prevented by active management of 3rd stage of labor, which includes the use of uterotonics, controlled cord traction, and uterine fundal massage. Prophylactic administration of uterotonics in 3rd stage can significantly reduce the rate of PPH from 18 to 15%.² World Health Organization recommends the use of oxytocin in active management of 3rd stage of labor. The review of trials found routine use of oxytocin, a drug which helps the uterus contract, may reduce the amount of blood loss. It can be given via intramuscular, intravenous, or intraumbilical route but there is not enough evidence about the preferred route of delivery of the drug. An intravenous bolus of 10 U of oxytocin has been associated with hypotension and prolonged infusion has been associated with water intoxication. The intraumbilical route not only appears to avoid adverse systemic effects, but it is also useful in women with limited venous access or in whom intravenous fluid should be restricted.³

Various studies and reports have been published on the intraumbilical injection of varying doses of oxytocin diluted in varying volumes of normal saline solution for management of the 3d stage, but the exact dose of oxytocin to be injected intraumbilically after fetal delivery for the active management of 3rd stage of labor remains controversial and has not been subjected to conclusive research. Thus, this study was conducted to determine the optimum dose of intraumbilical oxytocin diluted in 50 mL normal saline solution, for management of 3rd stage of labor⁴ and monitor its effects on duration and amount of blood loss.

MATERIALS AND METHODS

The study comprised 200 antenatal cases. The inclusion criteria were singleton pregnancies at term and spontaneous onset of labor. The exclusion criteria were medical disorders of pregnancy like antepartum hemorrhage (APH), multiple pregnancy, polyhydramnios, chorioamnionitis, severe anemia, Rh negative pregnancy, pregnancy-induced hypertension (PIH), prior cesarean delivery, and forceps or ventouse application during delivery.

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The study protocol was approved by the Institutional Ethical Committee and written informed consent was obtained before enrollment. Each participant had her detailed history taken, underwent a clinical examination, and had her hemoglobin and hematocrit values measured before delivery. The progress of labor was monitored and the participants were allocated to any of the four groups by lottery system (random sampling method). Fifty cards corresponding to each group were placed in a wooden box. One card was picked up for each patient to allot a particular group. One of the standard dose of drug (oxytocin) was administered to each of the cases just after delivery of the anterior shoulder of the baby.

Dose of intraumbilical drug to be administered (Study Groups):

Group A: 10 U (2 ampules) oxytocin with 50 mL saline

Group B: 20 U (4 ampules) oxytocin with 50 mL saline

Group C: 30 U (6 ampules) oxytocin with 50 mL saline

Group D: 50 mL normal saline (control group)

Timing and Mode of Administration of Drug

Each of the four doses of the drug was administered intra-umbilically just after delivery of baby and cord clamping. 50 mL of syringe was loaded with 50 mL normal saline, with or without different concentrations of oxytocin as per management protocol of the group under study. After delivery of the baby, the cord was clamped 1 cm from introitus and cut, followed by intraumbilical injection of normal saline, with or without oxytocin, just proximal to the clamp. Another clamp was placed proximal to the site of injection to prevent leakage of injected fluid. The

placenta was delivered by controlled cord traction, and placenta and membranes were examined for completeness after expulsion. The blood loss during the 3rd stage of labor was measured in Brass V drape.⁴ Blood clots were weighed separately considering 1 g equal to 1 mL of blood. Blood-soaked swabs were weighed, the known dry weight subtracted, and the calculated volume added to that of the blood volume of measuring bag.

Postpartum hemorrhage in the present study was considered as blood loss of more than 500 mL during the 3rd stage of labor. Once the blood loss exceeded 500 mL, the patients were managed by giving additional oxytocins. The amount of blood loss, duration of 3rd stage of labor, 3rd stage complication like retained placenta, and other side effects of oxytocins like, nausea, vomiting, etc. and need for additional oxytocins were noted. The maternal hemoglobin and hematocrit were repeated 24 to 48 hours after the delivery and change in hemoglobin and hematocrit were taken as an objective measure of PPH. Vitals were recorded before and after delivery. Patients were observed for 2 hours following delivery for vital signs and bleeding per vaginam. The occurrences of side effects like nausea, vomiting, shivering, fever, diarrhea, etc. were recorded within the first 2 hours of delivery. Patients having any operative intervention in the form of ventouse or forceps application during the 3rd stage of labor were excluded from the study.

STATISTICAL ANALYSIS

Statistical analysis of the four study groups, as shown in Table 1, was done by one-way analysis of variance

Table 1: Observations

Parameters	Group A (10 U + 50 mL NS) n=50	Group B (20 U + 50 mL NS) n=50	Group C (30 U + 50 mL NS) n=50	Group D (50 mL NS) n=50
Mean duration of 3rd stage (minutes)	4.64±1.97	3.10±1.18	1.86±0.41	4.74±1.74
Range	2.00–4.70	1.80–3.90	1.20–2.80	1.50–5.10
p-value between groups	A vs B=0.001 A vs C=0.001 A vs D > 0.05	B vs C=0.009 B vs D=0.001	C vs D=0.001	
Mean amount of blood loss (mL)	245.10±63.19	204.20±30.89	188.30±18.26	296.70±82.40
Range	190–450	110–300	130–220	200–650
p-value between groups	A vs B=0.002 A vs C=0.001 A vs D=0.001	B vs C > 0.05 B vs D=0.001	C vs D=0.001	
Mean fall in hemoglobin level before and after delivery (gm/dL)	1.1±0.23	1.05±0.27	0.90±0.19	1.5±0.43
Range	0.8–1.8	0.9–1.6	0.6–1.3	1.1–0.43
p-value between groups	A vs B > 0.05 A vs C > 0.05 A vs D=0.001	B vs C=0.001 B vs D=0.001	C vs D=0.001	
Mean fall in hematocrit before and after delivery (%)	3.61±1.02	2.55±0.71	1.88±0.76	3.81±0.86
Range	2.40–4.10	1.40–3.80	1.00–2.10	2.80–4.80
p-value between groups	A vs B=0.001 A vs C=0.001 A vs D > 0.05	B vs C=0.001 B vs D=0.001	C vs D=0.001	

and the *post hoc* test used for multiple comparisons was Bonferroni. A *p*-value of less than 0.05 was considered to be statistically significant. Analysis was done in statistical software for Statistical Package for the Social Sciences (SPSS) version 18 package.

RESULTS

The mean duration of 3rd stage of labor in different study groups was 4.64 ± 1.97 (group A), 3.10 ± 1.18 (group B), 1.86 ± 0.41 (group C), and 4.74 ± 1.74 (group D) and the difference was statistically significant.

The mean amount of blood loss during 3rd stage of labor was 245.10 ± 63.19 (group A), 204.20 ± 30.89 (group B), 188.30 ± 18.26 (group C), and 296.70 ± 82.40 (group D). It was also statistically significant.

The mean fall in hemoglobin (Hb) before and after delivery was 1.10 ± 0.23 , 1.05 ± 0.27 , 0.90 ± 0.19 , and 1.5 ± 0.43 in groups A, B, C, and D respectively. The *p* value was statistically significant.

There was statistically significant fall in mean hematocrit (Hct) percentage in predelivery and postdelivery values. The mean values of fall in various groups were 3.61 ± 1.02 (group A), 2.55 ± 0.71 (group B), 1.88 ± 0.76 (group C), and 3.81 ± 0.86 (group D).

The smallest volume of blood loss and the smallest difference in hemoglobin and hematocrit values were noted in group C, and the largest differences in hemoglobin and hematocrit values were noted in group D.

DISCUSSION

Various methods have been used for managing the 3rd stage of labor like traditional method without use of oxytocins, use of oxytocins by an intramuscular route or as continuous infusion, use of methergin at delivery of anterior shoulder of baby, or after the delivery of placenta, etc.⁵ However, because of the side effects of these drugs, associated complications, and some practical difficulties in administering them, there has been a constant search for a safe, effective, and practical method of management of 3rd stage of labor.⁶ Intraumbilical administration of diluted oxytocin has been proposed as a simple, effective, and practical method for the active management of 3rd stage of labor.⁷

Various authors have reported conflicting results regarding this method.^{8,9} On reviewing the literature, a significant variability has been observed as far as important factors like patient selection, volume of saline used, concentration of oxytocin, and timing of injection, following delivery of baby are concerned.^{10,11}

This study was carried out with the aim of minimizing the variability in the abovementioned factors and evaluate the effect of different concentrations of oxytocin in a

fixed volume of saline. The present study was designed and carried out at the Department of Obstetrics and Gynecology, Dr. Sushila Tiwari Memorial Government Hospital and Government Medical College, Haldwani, on 200 patients with singleton pregnancy at 37 to 41 weeks in labor between May 2012 and April 2014.

Compared with group D in which 50 mL normal saline solution was administered intraumbilically, a significant reduction in amount of blood loss and duration of 3rd stage of labor was observed when oxytocin was added to the normal saline solution in various doses in different study groups. When the concentration of oxytocin was increased from 10 IU in group A, to 20 IU in group B, a further reduction in amount of blood loss and duration of 3rd stage of labor was noted, and the difference was statistically significant. When the concentration was increased to 30 IU in group C, a highly significant reduction in the duration of 3rd stage and amount of blood loss was noted.

The difference in hemoglobin and hematocrit values before and after delivery followed the same pattern, with group C having the smallest mean volume of blood loss and smallest mean differences in hematocrit values.

Several studies have used varying volumes of saline solution in which oxytocin was diluted and injected intraumbilically for the active management of 3rd stage of labor. Brandt reported that the capacity of the placenta (i.e., the amount of fluid required to be administered through the umbilical cord to reach the placental surface) varies from 45 to 130 mL and depends on the size of placenta. It is likely that 50 mL of solution is appropriate to trigger the hydrostatic dissection at the placental surface. This dissection facilitates the delivery of high concentration of oxytocin at the placental bed and uterine wall, resulting in myometrial contraction and further placental separation.¹²

As observed in the present study, an intraumbilical injection of 50 mL normal saline with 30 IU of oxytocin is a safe, simple, effective, and noninvasive method for the active management of 3rd stage of labor. It may prevent the complications of a prolonged duration of the 3rd stage, particularly in women in whom ergometrine administration is contraindicated, have limited intravenous access, or intravenous fluids should be restricted.

CONCLUSION

On the basis of this study, we conclude that intraumbilical injection of 50 mL normal saline mixed with 30 IU of oxytocin was most effective in reducing the duration of the 3rd stage of labor. Also, it resulted in statistically highly significant reduction in the blood loss in the 3rd stage of labor. A significant reduction was also noted in the difference between predelivery and postdelivery hemoglobin and hematocrit values. Hence, it can be concluded that

intraumbilical injection of 30 IU of oxytocin diluted in 50 mL of normal saline appears to be a safe, practical, and effective method of active management of 3rd stage of labor and prevention of 3rd stage complications.

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