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Intraumbilical oxytocin compared to placental cord drainage in the management of third stage of labor: A randomized controlled study

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Abstract
Objective: To compare the effectiveness of intraumbilical oxytocin and placental cord drainage in the management of third stage of labor.
Design: A prospective randomized clinical trial.
Study started: 1 September 2017.
Study completed: 30 January 2018.
Setting: At Ain-Shams University Maternity Hospital.
Subjects: One hundred and fifty pregnant women between 18-35 years of age with normal pregnancy and a singleton fetus at a gestational age of 37 - 42 weeks in a cephalic presentation with neonatal birth weight of 2500 to 4500 grams recruited from the delivery ward of our hospital.
Methods: The 150 study participants were randomly allocated into three groups either 20 units of oxytocin injected in the umbilical vein after clamping (Group A, n = 50), placental cord drainage (Group B, n = 50) or no intervention (Group C, n = 50).
Main outcome measure: Duration of the third stage of labor.
Secondary outcome measure: Retained placenta, need for manual removal of placenta and the drop in Hemoglobin level postpartum.
Results: there was a significant statistical difference between all groups regarding the duration of the third stage of labour ($p < 0.05$). With the duration was significantly shorter in the study groups A&B than the control group C, with significantly shorter duration in group B compared to Group A (P1 is $0.001 < 0.05$). There was statistical difference between all groups regarding Hemoglobin reduction ($p<0.05$).With hemoglobin level significantly reduced in the control group C than the study groups A&B (P2 is $0.016<0.05$ and P3 is $0.0001<0.05$) with significantly higher reduction in group A than Group B (P1 is $0.001<0.05$). As regard Retained placenta and the need for manual removal of placenta there was non-significant increase in the control group C (2 cases) which wasn't statistically significant ($p>0.05$) while there were no cases in study groups A&B.
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 in addition a significant decrease in the hemoglobin and hematocrit drop postpartum, however there were non-significant reduction of Retained placenta and the need for manual removal of placenta, Larger studies are necessary to confirm these findings.

Keywords: Intraumbilical oxytocin; placental cord drainage; third stage of labor; postpartum hemorrhage

Introduction

Normal Labor is defined as a physiologic process which includes spontaneous expulsion of a single mature fetus (37 completed weeks-42. weeks), presented by vertex through the birth canal, within a reasonable time (not less than 3 hours or more than 18 hours), without complications to the mother or to the fetus [1].

Normal labor includes 4 stages: The 1st stage begins with the onset of labor and ends with full cervical dilation followed by the 2nd stage of labor including the interval between full cervical dilation and the delivery of the infant, then the 3rd stage of labor which is the duration from the birth of the infant to the delivery of the placenta, umbilical cord and fetal membranes, the 4th stage or puerperium follows delivery and concludes with the resolution of the physiologic changes of pregnancy usually by 6 weeks postpartum in which the reproductive tract returns to the Non-pregnant state and ovulation may resume [2].

During the third stage of labor complications are common and can threaten the mother's life. The most common complication is postpartum hemorrhage (PPH), which remains a leading cause of maternal mortality, especially in developing countries (25.0%), with placental retention and uterine atony are underlying causes of prolonged 3rd stage leading to postpartum hemorrhage, Women who survive PPH are likely to suffer from anaemia and other complications [3].

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 [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]. 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 [6].

The WHO recommends that all women giving birth should be offered uterotonics during the third stage of labour for the prevention of PPH; oxytocin (intramuscular/intravenous, 10 international units (IU) is the uterotonic drug of choice within 2 minutes after delivery of the fetus, delayed clamping of umbilical cord for 2 minutes and controlled traction of umbilical cord to prevent PPH [7].

One of the methods of active management of 3rd stage of labor 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, the resulting tension causes the decidua spongiosa to give way with the formation of a hematoma, which then accelerates the process of placental separation [8]. 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 [9, 10, 11, 12]. 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 [13].

One of the 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 for a duration of three minutes [14, 15].

Patients and Methods

Population of the study

All pregnant women in in the active phase of labour attending the delivery ward were submitted to:

1. Detailed complete history taking including

- Personal History: Maternal age and socioeconomic status
- Obstetric History: Gravidity and parity, previous multiple pregnancies, previous macrocosmic fetus, previous pregnancy induced hypertension, previous gestational diabetes mellitus, liver diseases, renal diseases, coagulation disorders and previous operative delivery as caesarean section, instrumental delivery, prolonged labor and previous PPH.
- Present History: Throughout history to exclude any induced medical or surgical disorder.
- Menstrual History
- Maternal Medical History: Hypertension, Diabetes Mellitus and Coagulopathies

2. Clinical Examination

- General examination: Full general examination was done with special concern to blood pressure, pulse, temperature, respiratory rate and general condition.
- Abdominal examination: For assessment of gestational age, fetal weight. Fetal lie, fetal presentation, amount of liquor, fetal heart rate, uterine contractions and scars of previous sections and operations.
- Pelvic examination: Was done to assess the progress of labor, cervical dilation, effacement, station, position, vertex presentation and pelvic adequacy.

3. Investigations

- Ultrasound assessment to evaluate GA, fetal weight, AFI and Placental site.
- Hemoglobin level, hematocrit value (Before and 24 hours postpartum).
- Blood grouping and Rh.

Inclusion criteria

- Pregnant women between 18-35 years of age with normal pregnancy.
- A singleton fetus at a gestational age of 37 - 42 weeks in a cephalic vertex presentation.
- Neonatal birth weight of 2500 to 4500 grams.

Exclusion criteria

- Indications for cesarean section.
- Previous CS or Previous Myomectomy.
- Hypertensive disorders of pregnancy.
- Intrauterine fetal death.
- Known or suspected fetal anomalies.
- Instrumental delivery.
- Multiple pregnancies.
- Antepartum hemorrhage
- Known coagulation disorder or any risk factor for PPH.
- Intrapartum hemorrhage before delivery of placenta.

Intervention

This is a randomized clinical trial which was conducted in Ain Shams Maternity hospital, this study included 150 women who were admitted at term pregnancy being in labour and were revised according to the mentioned inclusion and exclusion criteria.

Patients were recruited from the delivery ward 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 150 study participants were divided into the following three groups using simple random distribution technique:

- **Group (A) "Study Group 1**

Group A (n = 50) women received intraumbilical vein injection of oxytocin 20 units diluted in 20 ml of 0.9% saline solution (at the most proximal site to the placenta) immediately after delivery of the baby, clamping and cutting the cord, the solution was milked toward the cord insertion at the placenta.

- **Group (B) "Study Group 2**

Group B (n = 50) women had placental cord 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 for a duration of three minutes.

- **Group (C) "Control Group**

Group C (n = 50) women as a control group received no intervention this scenario included placental cord clamping and cutting after 2 minutes of delivery of the baby.

Then the placenta in the women of the 3 groups been delivered using controlled cord traction after appearance of clinical signs of placental separation.

The women were kept under observation for the next 2 hours for any complications, and the vital signs and uterine tone were monitored every 15 minutes for 2 hours following delivery of the baby and hemoglobin levels were measured 12 hours postpartum.

Outcome Measures

- **1ry outcome**

Duration of the third stage of labor

- **2ry outcomes**

1. Retained placenta.

Retained placenta is defined as a placenta that remained in the uterus for 30 minutes or more after delivery [16]**.**

2. The need for manual removal of placenta.
3. The drop in Hb will be recorded.

Results

Table 1: Comparison between the three studied groups regarding demographic data

Demographic data	Group A	Group B	Group C	F p	P1 P2 P3
Age by years					
Min	19.00	19.00	20.00	0.505	0.416
Max.	35.00	35.00	36.00	0.604 N.S.	0.365
Mean	26.62	27.14	27.62		
± S.D.	±5.09	±5.11	±4.71		0.452
BMI					
Min	19.60	20.90	19.40	0.150	0.802
Max.	33.30	32.90	33.30	0.861 N.S.	0.685
Mean	25.61	25.97	25.78		0.771
± S.D.	±3.106	±2.997	±3.619		
GA in weeks					
Min	37.00	38.00	37.00	1.745	0.211
Max.	40.00	41.00	42.00	0.178 N.S.	0.198
Mean	39.08	39.74	39.72		0.213
± S.D.	±1.848	±1.67	±1.565		
Parity					
Min	0.00	0.00	0.00	0.808	0.421
Max.	3.00	4.00	3.00	0.448 N.S.	0.365
Mean	1.42	1.60	1.32		
± S.D.	±1.18	±1.03	±1.13		0.254

Table 2: Comparison between the three studied groups regarding clinical data

Clinical data	Group A	Group B	Group C	F P	P1 P2 P3
Neonatal weight in gm					
Min-Max.	2870.0 -3600.0	2870.00 -3560.00	2900.00 -3600.00	1.012	0.231
Mean	3232.00	3185.20	3242.60	0.366	0.365
± S.D.	±216.63	±223.96	±203.05	N.S.	0.412
Hb Before in gm/dl					
Min-Max.	8.90-14.20	9.20 -13.70	9.10 -15.00	0.842	0.236
Mean	11.56	11.58	11.88	0.433	0.445
± S.D.	±1.29	±1.27	±1.56	N.S.	0.512

F = Anova test P probability P is significant if < 0.05 P1 comparison between group A and B P2 comparison between group A and C P3 comparison between group B and C

Table 3: Comparison between the three studied groups regarding the duration of the third stage of labour

3rd stage duration in minutes	Group A	Group B	Group C
Range	3.00-12.00	2.00-8.00	3.00-32.00
Mean	7.72	5.52	8.80
± S.D.	±2.72	±2.04	±4.92
F	11.732		
p	0.0001*		
P1	0.001*		
P2	0.042*		
P3	0.0001*		

Table 4: Comparison between the three studied groups regarding Hemoglobin level Reduction

Hb Reduction in gm/dl	Group A	Group B	Group C
Range	-1.20 - -0.70	-0.70 - -0.40	-2.00- -1.00
Mean	-0.98	-0.54	-1.51
± S.D.	±0.17	±0.11	±0.30
F	260.321		
p	0.0001*		
P1	0.001*		
P2	0.016*		
P3	0.0001*		

F = Anova test P probability P is significant if < 0.05 P1 comparison between group A and B P2 comparison between group A and C P3 comparison between group B and C

Table 5: Comparison between the three studied groups regarding the need for Manual Placenta delivery and Retained Placenta

Manual Placental delivery& Retained Placenta		Group A	Group B	Group C	Total
No	Count	50	50	48	148
	% within Group	100.0%	100.0%	96.0%	98.7%
Yes	Count	0	0	2	2
	% within Group	0.0%	0.0%	4.0%	1.3%
Total	Count	50	50	50	150
	% within Group	100.0%	100.0%	100.0%	100.0%
X^2		4.449			
p		0.108 N.S.			
P1		0.125			
P2		0.311			
P3		0.089			

X2= Chi-Square test P probability P is significant if < 0.05 P1 comparison between group A and B P2 comparison between group A and C P3 comparison between group B and C

Table 6: Correlation between Hb reduction and 3rd stage duration in relation to other variables.

		Hb Reduction	3rd stage duration
Hb Reduction	r	-	.297**
	p	-	.0001
Age	r	.001	-.055
	p	.990	.501
BMI	r	-.040	-.045
	p	.625	.582
Gestational age	r	-.011	.093
	p	.894	.256
Parity	r	-.082	-.115
	p	.316	.163
Hb Before	r	.032	-.004
	p	.697	.958
Neonatal weight	r	.112	.088
	p	.171	.285

R correlation coefficient p probability correlation is significant if p < 0.05

Table 7: Multiple logistic regression analysis of different risk factors which affect the Hemoglobin level reduction

Model Summary [b]						
Model	**R**	**R Square**	**Adjusted R Square**		**Std. Error of the Estimate**	
1	.319	.102	.057		.43488	
b. Dependent Variable: Hb Reduction						
ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3.035	7	.434	2.292	.030[b]
	Residual	26.856	142	.189		
	Total	29.890	149			
a. Dependent Variable: Hb Reduction						
Coefficients [a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
	(Constant)	.776	1.070		.725	.469
	Age	.000	.007	.001	.017	.986
	BMI	-.004	.011	-.032	-.403	.687
	Gestational age	-.014	.021	-.055	-.668	.505
	Parity	-.016	.033	-.040	-.497	.620
	Hb Before	.009	.027	.028	.339	.735
	3rd stage duration	.031	.009	.288	3.563	.001
	neonatal weight	.000	.000	.089	1.101	.273
a. Dependent Variable: Hb Reduction						

Table 8: Multiple logistic regression analysis of different risk factors which affect the third stage duration

Model Summary[b]					
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**	
1	.334[a]	.111	.068	3.97837	
b. Dependent Variable: 3rd stage duration					
ANOVA[a]					
Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	281.675	7	40.239	2.542	.017[b]
1 Residual	2247.498	142	15.827		
1 Total	2529.173	149			
a. Dependent Variable: 3rd stage duration					
Coefficients[a]					
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-2.068	9.807		-.211	.833
Age	-.044	.068	-.053	-.652	.516
BMI	-.038	.102	-.030	-.375	.708
Gestational age	.204	.196	.085	1.045	.298
Parity	-.358	.297	-.097	-1.202	.231
Hb Before	-.081	.242	-.027	-.334	.739
neonatal weight	.001	.002	.039	.491	.624
a. Dependent Variable: 3rd stage duration					

Statistical analysis of the data

Data were fed to the computer using IBM SPSS software package version 21.0. Qualitative data were described using number and percent. Comparison between different groups regarding categorical variables was tested using Chi-square test.

Quantitative data were described using mean and standard deviation for normally distributed data.

For normally distributed data, comparison between more than two population were analyzed F-test (ANOVA) to be used.

Significance test results are quoted as two-tailed probabilities. Significance of the obtained results was judged at the 5% level.

$$\text{Mean value}(\bar{X}) = \frac{X}{n}$$

Where X = the sum of all observations.
n = the number of observations.

$$\text{The standard deviation S.D.} = \sqrt{\frac{\sum (X - \bar{X})^2}{n-1}}$$

Where $\Sigma (Xi - X)^2$ = the sum of squares of differences of observations from the mean.

One-way analysis of variance (ANOVA) was performed for comparison between more than two groups

Variance ratio F was computed by the formula.

$$F_{(r-1),(n-1)} = \frac{\text{Mean square between classes}}{\text{Mean square within classes}}$$

Where r = number of groups
n = total sample size

Chi-Square test

It tests the association between qualitative nominal variables, it is performed mainly on frequencies. It determines whether the observed frequencies differ significantly from expected frequencies.

$$\text{Computed} \quad X^2 = \sum \frac{(O_i - E_i)^2}{E_i}$$

Where E= expected frequency O = observed frequency

$$E = \frac{\text{Raw Total X Column Total}}{\text{Grand Total}}$$

Correlation Coefficient (r) =

$$\frac{(\sum x_i y_i) - \frac{(\sum x_i)(\sum y_i)}{n}}{\sqrt{\left[\sum x_i^2 - \frac{(\sum x_i)^2}{n}\right]\left[\sum y_i^2 - \frac{(\sum y_i)^2}{n}\right]}}$$

Where: X and Y are the values of the first and second observations in the same individual. Correlation can be significant if $p < 0.05$.

Multiple Logistic Regression Analysis

Simple logistic regression analysis refers to the regression application with one dichotomous outcome and one independent variable; multiple logistic regression analysis applies when there is a single dichotomous outcome and more than one independent variable.

Discussion

In the current study, there was no significant difference between the study groups A&B and the control group C regarding the

Demographic data including (maternal age, BMI, Parity and Gestational Age) where ($p > 0.05$). Also, there was no significant difference between the 3 groups regarding the clinical data (Neonatal weight and Hb level before delivery) where ($p > 0.05$).

In the current study the mean duration of the third stage of labour of women included in Study group A was 7.72±2.72 min, study group B was 5.52±2.04 min and in control group C was 8.80 ±4.92 min using ANOVA test, this shows that there's significant statistical difference between all groups regarding the duration of the third stage of labour $P < 0.05$.

The duration was significantly shorter in the study groups A&B than the control group C, with significantly shorter duration in group B compared to Group A (P1 is 0.001 <0.05). Which means that both intraumbilical oxytocin injection and cord drainage are more effective than the expectant management of the third stage of labour in reducing duration of the third stage of labour.

However, the current study revealed also that Cord drainage is more effective than intraumbilical oxytocin injection in reducing duration of the third stage of labour.

The correlation between third stage duration in relation to other variables was done, it was found that there was no significant relation between the 3rd stage duration and in the other side the age, anthropometric measurements, gestational age, parity, Hb before and neonatal weight.

Also, the multiple logistic regression analysis of different risk factors which affect 3rd stage duration to confirm the results, it was found that there were no risk factors affecting the 3rd stage duration.

Results of the current study as regard the duration of the 3rd stage agreed with the study of *Makvandi and her colleagues* [13]. In 2013, a prospective clinical trial in Ahvaz of Iran, included 152 primigravida women divided into 3 groups, 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 third stage of labor was significantly shorter in group A and B as compared to group C (3.54, 3.50 vs. 5.16min, P = 0.001), so they concluded that either the use of intraumbilical oxytocin injection or the cord drainage in the management of the third stage of labour result in a significant reduction of the duration of the third stage of labour.

Also *Sharma and his colleagues* [17] agreed with the results of the current study regarding the mean duration of the third stage, but they included only 2 groups, one study group for cord drainage and the other as control group. In 2005, a prospective study in New Delhi of India included 958 women having vaginal delivery, who were randomized to the drainage method (478 women) or controlled cord traction method (480 women) for placental delivery, 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 which was statistically significant, so they concluded that the use of the cord drainage in the management of the third stage of labour results in a significant reduction of the duration of the third stage of labour**.**

Similarly, *Bandyopadhyay and Pal* [18] also agreed with the results of the current study regarding the mean duration of the third stage but they included only 2 groups, one study group for intraumbilical oxytocin injection and the other as control group. in 2015, Bandyopadhyay and Pal in Manipur of India randomly assigned 200 women who undergone vaginal delivery and were divided into 2 groups, one group received 10 IU oxytocin intraumbilical and the other group received normal saline intraumbilical, the duration of the third stage of labour was significantly shorter in the study group as compared to the control group (4.2±4.1 min vs 5.5±4.5), so they concluded that the use of intraumbilical oxytocin injection in the management of the third stage of labour results in a significant reduction of the duration of the third stage of labour.

On the other hand, the study of *Ghulmiyyah and his colleagues* [11] disagreed with the results of the current study regarding the mean duration of the third stage, it concluded that intraumbilical oxytocin has no rule in shortening the duration of the third stage of labour, in 2007, A randomized double-blind placebo-controlled trial was done in Georgia of USA, included 79 women were randomly divided into 2 groups, one group (control) received 20 IU oxytocin diluted in 30 ml saline intraumbilical while the other group (control) received 30 ml saline intraumbilical. It found that there was no significant difference regarding the duration of the 3rd stage (5.9 min vs 7.8 min), this may be due to the small sample size that failed to show the clinical difference regarding the duration of the third stage with the actual power of the study was only 60%. Another speculation was due to the difference in skills between different surgeons in the manuals of intraumbilical vein injection.

In addition, another study also disagreed with the results of the current study as regard the duration of the third stage of labour, In 2007, a prospective comparative study conducted in Thapathali of Kathmandu, *Ojha and Malla* [19] 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, they reported that intraumbilical oxytocin had no added benefit 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). This may be due to smaller amount of Oxytocin used 10 IU in that study vs. 20 IU in the current study, which is less effective in facilitating placental separation.

In the current study, Hemoglobin level Reduction of women included in Study group A was 0.70 – 1.20 gm/dl, study group B was 0.40 – 0.70 gm/dl and in control group C was 1.00 – 2.00 gm/dl using ANOVA test, this shows that there's significant statistical difference between all groups regarding Hemoglobin Reduction ($P < 0.05$).

The current study revealed that Hemoglobin level was significantly reduced in the control group C than the study groups A&B (P2 is 0.016<0.05 and P3 is 0.0001<0.05) with significantly higher reduction in group A than Group B (P1 is 0.001<0.05).

The correlation between the Hb level reduction in relation to other variables was done, it was found that there was no significant relation between the Hb reduction and in the other side

the age, anthropometric measurements, gestational age, parity, Hb before and neonatal weight. While there was a positive significant correlation between the 3rd stage duration and the percent of reduction in Hb level (increased 3rd stage duration is associated with increased drop in Hb level).

Also, the multiple logistic regression analysis of different risk factors which affect the Hb level reduction to confirm the results, it was found that the only significant risk factor to increase the Hb reduction was the 3rd stage duration (whenever the 3rd stage increased, the was increased reduction in hemoglobin level).

So, the current study concludes that the use of intraumbilical oxytocin or the use of cord drainage results in significant reduction of the blood loss indicated by the reduction in hemoglobin drop postpartum and postpartum hemorrhage in the 3rd stage of labour. In addition, the current study revealed that Cord drainage is more effective than the intraumbilical oxytocin injection in reducing hemoglobin drop postpartum.

The study of *Movahed and her colleagues* [20] agreed with the results of the current study regarding the mean drop of hemoglobin level postpartum, but it included only 2 groups, one study group for intraumbilical oxytocin injection and the other as control group. In 2012, a double blind randomized clinical trial in Ghazvin Kowsar of Iran was conducted on 200 women undergone vaginal delivery randomly divided into 2 groups one group (study) received 10 IU oxytocin diluted in 9 cc ringer intraumbilically with 10 cc Ringer by peripheral vein, while the other group (control) received 10 cc Ringer intraumbilically and 10 IU Oxytocin diluted in 9 cc ringer by peripheral vein. The study revealed that the mean drop in hemoglobin was 1.5±0.96 gm/dl in the intraumbilical oxytocin injection group which is significantly lower compared to 1.35±0.94 gm/dl in control group, so they concluded that the use of intraumbilical oxytocin results in significant reduction of hemoglobin level drop postpartum.

Similarly, the study of *Ghulmiyyah and his colleagues* [11] showed that the mean drop in Hb was significantly reduced in the intraumbilical oxytocin injection group compared to the control group (1.3 gm/dl vs 1.9 gm/dl), despite the clinical disagreement between the current study and this study regarding the duration of the third stage, intervention in the study group and management of the control group.

On the other hand, there's a study that disagreed with the results of the current study regarding the mean drop of hemoglobin postpartum. In 2013, a randomized clinical trial was carried out in Kermanshah of Iran, *Nankali and his colleagues* [21] included 178 women, divided into 2 groups in which immediately after delivery of the fetus, Oxytocin infusion 20 IU/L was started in both groups. Moreover, one group received 10 IU of Oxytocin in the umbilical vein on the maternal side while the other group received 1ml normal saline in the umbilical vein of the cord on the maternal side, it showed that non-significant difference between both groups (0.13 gm/dl in study vs 0.91 gm/dl in control group). That's may be due to the use of IV oxytocin infusion in the 2 groups that reduced the blood loss and there by the Hb difference.

The current study revealed that there was no significant statistical difference between the study groups A&B and Control group C regarding Retained placenta and the need for Manual Placenta delivery with results (0%, 0% and 4% respectively) using Chi-Square test where $p > 0.05$.

However, there was non-significant increase in the control group C (2 cases) versus no cases in study groups A&B which is not statistically significant, revealing one limitation of the study, which is the relatively small sample size for looking at parameters such as retained placenta.

The study of *Makvandi and her colleagues* [13] showed that there were no reports of the need for manual removal of placenta nor retained placenta. (Agreeing with the results of the current study, despite the 2 cases of retained placenta in control group C in the current study of no statistical significance).

Another study which also agreed with the results of the current study regarding the retained placenta and the need for manual removal of placenta, but it included only 2 groups, one study group for intraumbilical oxytocin injection and the other as control group. In 2010, a prospective randomized double-blind trial was carried out in Istanbul of Turkey, *Güngördük and his colleagues* [12] included 412 women undergone vaginal delivery were randomly divided into 2 groups. One group (study group) received 20 IU of oxytocin diluted in 26ml saline intraumbilical while the other comparative group received 30 ml saline intraumbilical, then all women received 10 IU of oxytocin IM following delivery of the fetus, it showed that the percentage of retained placenta needed manual removal in the intraumbilical oxytocin injection group compared to the control group was (0% vs 4.4%) which were non-significant.

The study of *Giacalone and his colleagues* [22] also agreed with the results of the current study regarding the retained placenta and the need for manual removal of placenta, but they included only 2 groups, one study group for cord drainage and the other as control group.in 2000, a randomized controlled clinical trial was done in Montpellier of France. It included 477 pregnant women to compare 239 women undergone placental cord drainage only with 238 women with expectant delivery of placenta, it showed that Retained placenta and the need for Manual removal of the placenta was 18 in women of cord drainage group and in 20 of the control group (P= 0.13). So they concluded that Cord drainage has no effect on reducing the incidence of manual removal of the placenta.

On the other hand, the clinical trial of *Nankali and his colleagues* [21] in 2013 disagreed with the results of the current study regarding the need for manual delivery of the placenta, it revealed that the need for manual delivery of the placenta was 1.1% and 5.1% in the intraumbilical oxytocin group and control groups respectively which was significantly higher. This is probably due to higher number of participants than the current study.

Similarly, *Bandyopadhyay and Pal* [18] also disagreed with the results of the current study regarding the need for manual delivery of the placenta showed that the need for manual removal of placenta was statistically significantly higher in the control group than the study group (5.1% vs 1.1%), that study differ in dosage of oxytocin, use of placebo, number of participants and there's no comparative group with cord drainage.

Implications of the current study for practice: As the aim of the current study was to assess the effects of the use of either

intraumbilical vein oxytocin injection or the cord drainage on the third stage of labor. The current study demonstrated that the use of intraumbilical oxytocin or the use of cord drainage results in significant reduction of the duration of the 3rd stage of labour. However, the cord drainage results in statistically significant shorter duration than the intraumbilical oxytocin injection (P1 is $0.001 < 0.05$) in addition a significant decrease in the hemoglobin level drop postpartum, while retained placenta and the need for manual reduction of placenta were non-statistically significantly reduced.

Implications of the current study for future research include: More research will in fact be necessary to refine and further elaborate our findings. There is a suggestion to focus on the effects of the use of either intraumbilical oxytocin or the use of cord drainage on midtrimester abortions. Also, if there is a statistical correlation between the use of either interventions in cases with retained placenta in relation to other demographic data.

Points of strength in the current study included that the interventions for all participants were done in the presence of the same observer, comparison between the 2 interventions in the same study in the presence of a control group, randomization and allocation were done immediately after delivery of the baby, there were no dropouts from the current study (n started = n completed), and correlation and multiple logistic regression analysis were done to confirm the results.

Points of weakness of the current study included that there was one limitation of the study, which was the relatively small sample size for looking at parameters such as retained placenta. Despite of the sample size calculation that stated a sample of 50 women in each group would provide a power of 95%, at 5% significance.

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 in addition a significant decrease in the hemoglobin drop postpartum. These methods save the parturient of the adverse systemic effects of parenterally 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

Recommendation

1. Intraumbilical vein injection of oxytocin can be used safely as a prophylaxis in the management of the 3rd stage of labour to reduce the duration of placental delivery and Haemoglobin & Hematocrit reduction postpartum.
2. Placental cord drainage should be encouraged for routine management of the 3rd stage of labour especially when no routine drug administration is planned because this method is simple, safe, noninvasive and not requiring any effort, cost or equipment and is relevant in rural areas.
3. Larger studies are necessary to confirm these findings.

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