Umbilical cord drainage versus intraumbilical cord oxytocin injection in management of third stage of labour

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Abstract:

Background: Postpartum hemorrhage is an important cause of maternal morbidity and mortality. Considerable difference of opinion exist regarding the optimal approach to the management of the 3rd stage of labour, practice varies between countries &between units.

Objectives: To evaluate the effectiveness of intra umbilical vein injection of oxytocin and umbilical cord driange in shortening the duration of third stage of labour.

Patient and Methods: In this randomized controlled study, 100 women were enrolled in this study they divided into three groups. (Group 1 ,N =30)received 20 units of oxytocin diluted in 20 ml 0.9% saline solution injected in the umbilical vein after clamping.(Group 2, N = 34) placental cord drainage.(Group 3, N= 36) with no intervention. The primary outcome was mean duration of third stage of labor.

Results: The third stage of labor was significantly shorter in group 1 and 2 as compared to group 3. Groups 1 shorten the duration of third stage of labor by 3 min. and group 2 shorten the duration of third stage of labor by 4.27 min.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 word: intraumbilical cord oxytocin, umbilical cord drainage, third stage of labour.

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Introduction:

The third stage of labour is considered to start when delivery of the fetus is completed and end when placenta and membranes have been expelled (1) this normally takes between 5-10 min., if longer than 30 min. it should be regarded as prolonged. (2)
Complications may occur unexpectedly at this stage & unless prompt action is taken to control the situation, serious maternal morbidity &sometimes mortality may occur.
Post partum hemorrhage (PPH) & retained placentas are the most common complications encountered during this period (3).The umbilical vein oxytocin injection is that oxytocin may be delivered directly to the retro placental myometrium by injecting it into the placental bed via the umbilical vein has stimulated a lot of interest. (4)
The technique allows the treatment to be directed specifically at the area of retro placental myometrium with sparing the remainder (4)
Herman et al' (5) demonstrated ultra sonographically that a retro placental myometrial contraction is mandatory in order to produce shearing forces upon the interface between the placenta & myometrium & lead to its detachment. (5)Herman et al divided the third stage of labour into 4 phases according to the ultrasound appearances:
The latent phase: This immediately follows delivery of the fetus, all the myometrium contracts except for that behind the placenta which remains relaxed.
- The contraction phase: the retro placental myometrium contracts leading to detachment phase.
- The detachment phase: where the placenta is sheared away from the decidua.
- The expulsion phase: the placenta is expelled from the uterus by uterine contraction.

Contractions occurring prior to delivery are insufficient to cause placental detachment as in the presence of the fetus, the myometrium unable to achieve the necessary strain for detachment (6).
The ultrasound studies demonstrated that the duration of the 3rd stage of labour is dependent on the length of the latent phase, & a prolonged 3rd stage is due to failure of contraction in the retro placental area.
Umbilical cord drainage involves the clamping and cutting of the umbilical cord after delivery of the baby but , after wards , immediately unclamping the maternal side of the cord and allowing the blood from the placenta to drain freely into the container , it has been suggested that draining blood from the placental cord reduce its bulkiness, allowing the uterus to contract and retract , this aiding delivery ,there are anecdotal beliefs among some practitioners that allowing umbilical cord drainage enhances delivery of placenta and reduce third stage complication.

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Patients and methods:

Study design and setting:

This study was conducted as randomized controlled trial at the department of Obstetric and Gynecology at Baghdad Teaching Hospital throughout the period between (January 2015 – june2015).

Inclusion criteria:

The studyinclude (100) pregnant women with the following criteria:

Gestational age between(36-41) completed weeks determined by last menstrual period and early ultrasound scan.

Singleton pregnancy.

Vertex presentation.

Viable fetus.

Vitally stable.

Women with spontaneous and induced labour.

Exclusion criteria:

Multiple pregnancy

Presentation other than vertex

Patients with previous uterine scar

Patient with current medical disorders

Patient with bad obstetrical history

Patient with known uterine malformation.

Presence of chorioamnionitis.

History of ante partum hemorrhage in current pregnancy.

Patient with polyhydramnios.

All patients in this study were already admitted to the department of obstetric and gynecology in labour ward where detailed history, full medical and obstetric examination was carried out. Before introducing in this study a verbal consent was obtained from each patient.

The patients were randomized into three groups:

1st group (A) (cord drainage group): ((numbers of patient are 34))

Unclamping the previously clamped and divided umbilical cord and allowing the blood from placenta to drain freely

2nd group (B)(oxytocin group): ((numbers of patient are 30))

was arranged to receive 20 IU of oxytocin diluted in normal saline (0.9 % NaCL) to final volume of 20 ML injected though umbilical vein.

3rd group (C) (control cord traction group): ((numbers of patient are 36))

In this group the placenta was delivered by control cord traction.All patients were observed in the labour ward during 1st and 2nd stage of labour, and patients with induction or augmentation of labour also included and closely observed with fetal monitoring.During labour the patients were observed every 2 hrs for pulse rate, blood pressure, temperature.The women in first group 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 third group as a control group received no intervention. Theplacenta was delivered by controlled cord traction after appearance of clinical signs of placental separation.After delivery of the fetus, the umbilical cord clamped immediately, and just above the clamp, under aseptic technique a sterile 20 ml syringe which was prepared already containing 20 IU of oxytocin diluted in 20 ml normal saline (0.9% NaCl) for the 2nd group, was injected directly to the umbilical vein.umbilical vein chosen rather than umbilical artery because umbilical vein is wider, single and injection through the artery cause vascular constriction which did not occur with the vein.After injection, milking of the cord done in upward direction to flush the solution up into the placenta, then wait till the signs of the placental separation, by which time the placenta is usually lying in the cervix or upper vagina, then the placenta delivered by brandt Andrew,s, manoeuvre.

After the placenta delivered, the placenta was examined to see if it is complete and there is no missingcotyledons. The duration of the 3rd stage of labour is counted from complete delivery of the fetus till placental delivery.Patients were observed for the 12 hours post partum to monitor the vital signs, presence of post partum complications, systemic symptoms,vaginal bleeding or passage of placental tissue per vagina. Before discharge each patient was counseled to report any bleeding, abdominal pain or discomfort, vaginal discharge, fever, generalized malaise, and passage of any tissue vaginally, if any of these symptoms occurred, they were asked to return to hospital immediately.

Statistical analysis:

Description analysis was used to show the mean ± SD and range for the studied parameters. ANOVA test was used to show the difference between the three studied groups and a correlation analysis was used to show if there was a relationship between any two parameters.A P value of less than 0.05 was considered significant, otherwise there was no significant.

Results:

Table 1: The descriptive analysis (mean ± SD and range) for gestational age, birth weight and duration of third stage of labour for the three groups of study

		N	Mean	Std. Deviation	Minimum	Maximum
Gestational age (week)	A*	34	37.94	1.25	36.00	41.00
	B**	30	37.50	1.33	36.00	40.00
	C***	36	37.88	1.42	36.00	41.00
Birth weight (g)	A	34	3397.05	416.68	2600.00	4100.00
	B	30	3420.00	500.62	2500.00	4500.00
	C	36	3294.44	422.87	2500.00	4100.00
Duration (minute) Of third stage of labour	A	34	2.30	.90	.75	4.00
	B	30	3.51a	.97	2.00	5.50
	C	36	6.57a,b	2.10	4.00	11.50

a: significantly different from group A (P = 0.0005)
b: significantly different from group B (P = 0.0005)
*A :umbilicalcord drainage group
**B :intraumbilicaloxytocin group
***C : controlled cord traction group

Table 2: The descriptive analysis (mean ± SD and range) for age and parity for the three groups of study.

		N	Mean	Std. Deviation	Minimum	Maximum
Age	A	34	23.9118	5.86395	15.00	37.00
	B	30	25.5333	6.60059	15.00	40.00
	C	36	23.2778	4.87918	16.00	33.00
Parity	A	34	1.3529	1.53509	primi	5.00
	B	30	2.2333	1.79431	primi	6.00
	C	36	1.6944	1.39016	primi	4.00

Using ANOVA analysis, it was found that there was no significant difference for age and parity between the three groups.

In group A, there was no correlation (no significant relation) between birth weight, gestational age, age, parity with duration (P>0.05). There was a significant correlation between parity and age (P=0.0005) and a negative correlation between parity and gestational age (P=0.001)

In group B, there was a significant negative correlation between duration and gestational age (P = 0.010, r = -0.464) while there was no correlation (no significant relation) between birth weight and gestational age, birth weight, age, parity with duration (P>0.05). There was a significant correlation between parity and age (P=0.0005) and parity with gestational age (P=0.005) as in group A. There was a correlation between birth weight and age (P=0.045).

Table 3: The correlation between parity,gestational age, birth weight and duration of third stage of labour for group A

		Age	Parity	Gestational age (week)	Birth weight (g)
Parity	R	.606			
	P value	0.0005			
	N	34			
Gestational age (week)	R	-.166	-.540		
	P value	0.349	0.001		
	N	34	34		
Birth weight (g)	R	.231	.186	-.041	
	P value	0.190	0.291	0.818	
	N	34	34	34	
Duration (minute)	R	.068	-.109	-.001	.021
	P value	0.702	0.538	0.995	0.907
	N	34	34	34	34

Table 4: The correlation between parity, gestational age, birth weight and duration of third stage of labour for group B.

		Age	Parity	Gestational age (week)	Birth weight (g)
Parity	R	.633			
	P value	0.0005			
	N	30			
Gestational age (week)	R	-.184	-.498		
	P value	0.330	0.005		
	N	30	30		
Birth weight (g)	R	.368*	.290	.134	
	P value	0.045	0.120	0.479	
	N	30	30	30	
Duration (minute)	R	.248	.259	-.464	-.089
	P value	0.187	0.167	0.010	0.641
	N	30	30	30	30

Table 5: The correlation between parity, gestational age, birth weight and duration of third stage of labour for group C.

		Age	Parity	Gestational age (week)	Birth weight (g)
Parity	r	.565			
	P value	0.0005			
	N	36			
Gestational age (week)	r	-.016	-.104		
	P value	0.927	0.547		
	N	36	36		
Birth weight (g)	r	.314	.449	-.209	
	P value	0.062	0.006	0.221	
	N	36	36	36	
Duration (minute)	r	.131	-.068	.090	.165
	P value	0.445	0.694	0.600	0.337
	N	36	36	36	36

In group C, there was no correlation (no significant relation) between birth weight, gestational age, age, parity with duration (P>0.05). There was a significant correlation between parity and age (P=0.0005) and significant correlation between birth weight and parity (P=0.006).

The paritywas grouped into three groups (nullipara, 1-3 and 4 or above) and then we compared the duration of third stage of labour between these three groups, we find:

In group A there was no significant difference of duration between parity groups (P>0.05)

In group B there was no significant difference of duration between parity groups (P>0.05)

In group C there was no significant difference of duration between parity groups (P>0.05).

Discussion:

The third and fourth stages of labor were uneventful, although significant complications can occur in this period. The most common is postpartum hemorrhage (PPH). While maternal mortality rates have declined significantly in the developed world, PPH remains a leading cause of maternal mortality in the developing countries (7).Blood loss within the first hour of delivery (4th stage) is an important precipitating factor for puerperal anemia. The third stage of labour is generally managed by observation until separation & expulsion of the placenta, which is followed by administration of methylergometrine. Delayed separation may lead to more bleeding (8).Golan et al (9) proposed that the injection of intra umbilical vein oxytocin leads to a high concentration of oxytocin at the uterine wall & may affect rapid placental expulsion.Intra umbilical vein oxytocin is therefore, a useful alternative in patients where methylergometrine is contraindicated or in cases where intravenous fluids need to be restricted (10). For optimum effect, rapid injection immediately after clamping of the cord is essential.The effectiveness of umbilical vein administration of oxytocin for placental delivery had been subject of debate &controversy (11) .The dose of oxytocin used, the volume which was injected & the timing of injection have varied widely. The dose of umbilical oxytocin varied from 10 IU to 100 IU (12) without reported side effects.In our study we used 20 IU oxytocin in 20 ml normal saline, administered immediately after cord clamping, the method of injection was by direct 21 gauge needle proximal to the clamp.Other method can be used as feeding tube or intra umbilical catheter introduced through the umbilical vein as far as possible to reach the placental bed.The high concentration of oxytocin stimulates a contraction of uterine muscle & decreases the area of the placental implantation site, this will result in cleavage of the placenta (13),our study revealed a statistically significant reduction in the duration of the 3rd stage of labour and placental expulsion.Reddy & Carey et al (14) used 20 lU of oxytocin to compare between UV oxytocin (25 patient) and traditional management of the third stage of labour(25 patient) , they found those who received UV oxytocin had a significantly shorter 3rd stage of labour, so intra UV appears to be a useful alternative to traditional management of the 3rd ‘ stage of labour (14) this is in agreement with our study. Dahiya P, Parim M ,Rathee S. et al (15) used 10 IU oxytocin diluted in 20 ml saline given through UV(50 patient) ,immediately after cord clamping & compared it to traditional management(50 patient)& found significantly less blood loss & shorter third stage of labour in UV oxytocin group(15) .N.J ovanic .N. Lazic et al (10) compare 4 groups of 30 patients each, the 3rd stage of labour in group 1 patients were physiologically managed , in group 2 were injected 30 ml of 0.9 % normal saline into UV ,in group 3 injected 30 ml of 0.9 % normal saline with 10 IU oxytocin , in group 4 were injected 30 ml of 0.9 % Normal saline with 20 IU oxytocin into UV.They found the application of 10 IU or 20 IU of oxytocin through UV leads to a statistically shorter 3rd stage of labour (P<0.0l),however dose increase of oxytocin for 100 % had no relation to neither duration nor blood loss of 3rd stage of labour. (P>0.0 l) (10)Heinonen&Pihkala et al

(12) used 75 IU oxytocin, &Wilken—Jensen et al (16) used 100 IU oxytocin .The injected volume ranged between 10 ml & 30 ml. (16)All trials used 20 ml saline solution except Chestnut &Wilox et al (17) ,who used 10 ml ,Reddy & Carrey et al (14) &N.JovanicN.Lazic et al (10) , used 30 ml Finally in all reports recommend the injection into the UV by using a 2l—gauge needle. The injection site was chosen on the proximal side of the clamp with the cord clamp left in place.

After the injection digital pressure was applied over the injection site & the content of the cord then was milked towards the placenta to facilitate perfusion (13). Pipingas et al (18) injected contrast medium into UV of 25 Freshly delivered placenta &took sequential x-ray films. Pipingas et al (18) suggested that volumes in excess of 20 ml should be used in further studies to ensure consistent perfusion (18). Dhillon and Daftary et al(19) used An alternative method for the active management of the third stage of labour on 50 patients. Ten units of oxytocin with 20 ml saline was injected into the umbilical vein immediately after baby's delivery and cord clamping. The results were compared with a control group of 50 patients in whom no oxytocin was injected, but intramuscular ergometrine0.5 mg was given following placentaldelivery whenever required, the average duration of third stage of labour was 9.4 minutes in the control group but only 4.1 minutes in the oxytocin group. It is particularly useful in patients in whom intravenous access is limited,or intravenous fluids need to be restricted and or ergometrine is contraindicated (19).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 contraction and retraction (10).

The Cochrane database of systemic reviews studied the effect of placental cord drainage on the third stage of labor (12). 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 (7).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.

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 and decreased blood loss and the risk of PPH.Intraumbilical cord injection of oxytocin (10 to 30 IU) can be considered as an alternative intervention before manual removal of the placenta.

Author contribution:

Study conception: Dr. Najmah M. Miran
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