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Original Research Article

A study of placental blood drainage in third stage of labour to prevent postpartum haemorrhage: a randomized controlled study

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ABSTRACT

Background: PPH is most common cause of maternal mortality accounting for 25-30% incidence and third stage of labour plays most crucial role in preventing postpartum haemorrhage.

Methods: A prospective randomized control study in which 100 low risk pregnant women, admitted to labour ward with term gestation were evaluated. They were divided into 2 groups- control group (controlled cord traction) and study group (placental cord blood drainage), 50 pregnant women in each group. Duration of third stage and Amount of blood loss in third stage were evaluated and compared between the 2 groups.

Results: Mean duration of third stage of labour in study group was 3.96 ± 1.36 minutes and in control group was 6.00 ± 2.12 minutes. The mean amount of blood loss in third stage of labour in study group was 99.80 ± 56.47 ml in control group was 171.760 ± 96.94 ml. Drop in haemoglobin level after delivery in control group was almost double than study group.

Conclusions: Placental cord blood drainage in the management of third stage is non-invasive, easy, safe method which can be used in active management of third stage of labour as it has minimal interference in natural mechanism of placental separation. Placental cord blood drainage should be encouraged for management of third stage of labour universally to all pregnant women specifically in low resource setting areas.

Keywords: Active management of third stage of labour, Controlled cord traction, Placental cord drainage, Postpartum haemorrhage

INTRODUCTION

Labour is physiological process but it is often associated with morbidity and mortality with most common cause being blood loss.

PPH is a critical obstetrics emergency particularly in presence of pre-existing maternal condition like anaemia and/or antepartum haemorrhage. It is most common cause of maternal mortality worldwide accounting for 25 to 30% of maternal mortality. And it is the first direct leading cause of maternal mortality in developing countries.

India has a maternal mortality rate of 113/100000 live birth. Maternal mortality rate of world is 211/100000 live birth.¹

PPH is defined as a “loss of blood estimated to be more than 500 ml per vagina within the first 24 hours of vaginal delivery” and PPH after caesarean section is defined as blood loss of 1000 ml or more.²

Third stage of labour has crucial role in obstetrics as prolongation leads to increase probability of maternal complication like uterine atony, retained placenta, PPH, sepsis, haemorrhagic shock and even maternal death.

Two methods of management of third stage of labour are 1) expectant management, 2) active management (widely preferred).

Active management of third stage of labour, including delayed cord clamping, controlled cord traction and administration of oxytocic drugs such as oxytocin have been beneficial.²

Unclamping the cord at maternal site and releasing the placental blood facilitate delivery of the placenta by reducing its bulkiness allowing the uterus to contract and retract effectively leading to delivery of the placenta and may reduce the duration of the third stage of the labour and blood loss.

Placental cord blood drainage in the management of third stage of labour is one method which can be used in active management of third stage of labour.

The present study undertaken to evaluate, the effectiveness of placental blood drainage via the umbilical cord during vaginal delivery in reducing the duration of third of stage of labour and blood loss in third stage, thereby reducing the incidence of postpartum haemorrhage.

Aims and objectives

To evaluate the effectiveness of placental blood drainage via the umbilical cord during vaginal delivery versus controlled cord traction 1) in reducing the duration of third stage of labour, 2) in reducing the amount of blood loss in third stage of labour, thereby reducing the incidence of postpartum haemorrhage.

METHODS

This was a prospective randomized control study done in department of obstetrics and Gynaecology, Tirath Ram Shah Hospital, Delhi. Study was done during period from October 2019 to August 2020.

In this study 100 low risk pregnant women admitted to labour ward with term gestation who fulfilled selection criteria were evaluated.

Inclusion criteria

Full term singleton pregnancy, vertex presentation, vaginal delivery, ability and willingness to provide informed consent.

Exclusion criteria

Haemoglobin less than 7 gm%, overdistended uterus (hydramnios, multiple pregnancy, large baby), antepartum haemorrhage, induced labour, intrauterine death, abnormal presentation, instrumental delivery, known coagulation disorders, medical disorders in pregnancy.

Demographic profile and detailed history were taken. Clinical examination (general physical examination, vitals, systemic examination), obstetric examination to assess gestational age, fetal presentation, fetal lie was done. Baseline investigation was recorded for complete blood count at time of admission in labour room and after 24 hours post-delivery.

Written informed consent was obtained for each woman before inclusion in study.

100 low risk pregnant women were randomly divided into 2 groups- control group (controlled cord traction), study group (placental cord blood drainage), 50 pregnant women in each group by using computer generated random number sequence.

Group C

In these women, after delivery of the baby the umbilical cord was doubly clamped and cut and placenta delivered by controlled cord traction after the signs of placental separation appears.

Group S

In these women, after delivery of baby the umbilical cord was unclamped immediately after it was cut and left open to drain into kidney tray until flow ceased, this prevented the drained blood from getting mixed with blood lost in third stage of labour. Placenta delivered by controlled cord traction after signs of placental separation appeared.

Delayed cord clamping was done in both groups. PPH drape put immediately after delivery of baby in both group and Inj. Oxytocin 10 Units i.m. given after delivery of placenta in both groups.

Amount of blood loss in third stage of labour was collected in PPH drape in both groups, PPH drape has calibrated from 50 ml on its lower part to measure amount of blood loss. Mops used for episiotomy were discarded.

The duration of third stage of labour was calculated using a stopwatch. If there was bleeding due to uterine atony 10 units oxytocin in 500 ml of saline drip was started. If uterus still did not contract adequately, 15-methyl-PGF₂ alpha (carboprost) 250 µg (after excluding respiratory illness) was given intramuscularly. Blood transfusion was given if indicated.

Blood collected in drape was measured. Care was taken not to mix drained blood from cord with blood loss during third stage of labour.

The pulse rate, blood pressure and state of the uterus were noted immediately after delivery. The women were kept under observation for next one hour for any complications.

The primary outcome were measured i) the duration of third stage of labour and ii) the amount of blood loss.

The secondary outcome were measured i) the incidence of retained placenta, ii) manual removal of placenta, iii) need for blood transfusion.

All details were entered in excel sheet. Statistical test of significance were applied.



Figure 1: Calibrated PPH drape.

Statistical analysis

Descriptive and inferential statistical analyses were carried out in the present study. Results on continuous measurements were presented on Mean±SD and results on categorical measurement were presented in number (%). Level of significance was fixed at p=0.05 and any value less than or equal to 0.05 was considered to be statistically significant. Chi square analysis was used to find the significance of study parameters on categorical scale.

Student t tests (two tailed, paired and unpaired) were used to find the significance of study parameters on continuous scale within and between two groups.

Based on the results of normality test (Kolmogorov Smirnov and Shapiro Wilk test), it was concluded that part of the data (mean difference) was not following the normal distribution, hence non parametric test was used. Mann Whitney U test was used to find the significance of study parameters on continuous scale between two groups.

The statistical software IBM SPSS statistics 20.0 (IBM Corporation, Armonk, NY, USA) was used for the analyses of the data and Microsoft word and Excel were used to generate graphs, tables etc.

RESULTS

It was a comparative randomized controlled clinical study.

Table 1: Demographic profile of the study participants.

Group	N	Mean age±SD	t value	P value
Study	50	22.44±3.447	0.364	0.716
Control	50	22.20±3.130		

The mean age of patients in study group was 22.4±3.44 years and in control group was 22.20±3.13 years. The p value was 0.716, which was more than 0.05. There was no significant difference seen in the age distribution between study and control groups.

Table 2: Comparison of gravida score among both the groups using chi square test.

			Gravida				Total
			G1	G2	G3	G4	
Group	Study	Count	14	25	10	1	50
		% within group	28.0%	50.0%	20.0%	2.0%	100.0%
Group	Control	Count	14	24	11	1	50
		% within group	28.0%	48.0%	22.0%	2.0%	100.0%
Total		Count	28	49	21	2	100
		% within group	28.0%	49.0%	21.0%	2.0%	100.0%

Chi square value: 0.068, p value: 0.995

Table 3: Comparison of parity among both the groups using chi square test.

			Parity			Total
			0	1	2	
Group	Study	Count	18	26	6	50
		% within group	36.0%	52.0%	12.0%	100.0%
Group	Control	Count	18	25	7	50
		% within group	36.0%	50.0%	14.0%	100.0%
Total		Count	28	36	13	77
		% within group	28.0%	36.0%	13.0%	77.0%

Chi square value: 0.097, p value: 0.953

Table 4: Comparison of third stage duration (minutes) among both the groups using chi square test.

		Third stage duration (minutes)				Total
		<6	6-12	>12		
Group	Study	Count	46	4	0	50
		% within group	92.0%	8.0%	0.0%	100.0%
	Control	Count	16	32	2	50
		% within group	32.0%	64.0%	4.0%	100.0%
Total	Count	62	36	2	100	
	% within group	62.0%	36.0%	2.0%	100.0%	

Chi square value: 38.294, p value: <0.001** (p<0.05- significant*, p<0.001- highly significant**)

Table 5: Comparison of third stage duration (minutes) in terms of [mean (SD)] among both the groups using unpaired t test.

Variables	Group	N	Mean	SD	t value	P value
Third stage duration (minutes)	Study	50	3.9694	1.36810	5.692	<0.001**
	Control	50	6.0028	2.12344		

Table 6: Comparison of blood loss (ml) in 3rd stage among both the groups using chi square test.

		Blood loss (ml)				Total	
		50-100	101-200	201-500	>500		
Group	Study	Count	43	5	2	0	50
		% within group	86.0%	10.0%	4.0%	0.0%	100.0%
	Control	Count	13	32	4	1	50
		% within group	26.0%	64.0%	8.0%	2.0%	100.0%
Total	Count	56	37	6	1	100	
	% within group	56.0%	37.0%	6.0%	1.0%	100.0%	

Chi square value: 37.441, P value: <0.001**

Table 7: Comparison of blood loss (ml) in 3rd stage in terms of [mean (SD)] among both the groups using unpaired t test.

Variables	Group	N	Mean	SD	t value	P value
Blood loss in 3rd stage (ml)	Study	50	99.80	56.478	4.525	<0.001**
	Control	50	171.60	96.940		

Table 8: Comparison of hemoglobin levels (gm/dl) before and after in terms of [mean (SD)] among both the groups using paired and unpaired t test.

Hemoglobin levels (gm/dl)	Study group	Control group	P value
Before delivery	10.562±0.5820	10.726±0.6067	0.171
After delivery	10.172±0.6000	9.972±0.6145	0.103
Difference	0.3900±0.18434	0.7540±0.37862	<0.001**
P value	<0.001**	<0.001**	

Table 9: Comparison of blood transfusion among both the groups using chi square test.

		Blood transfusion			Total	
		1PRBC	2PRBC	N		
Group	Study	Count	1	0	49	50
		% within group	2.0%	0.0%	98.0%	100.0%
	Control	Count	1	2	47	50
		% within group	2.0%	4.0%	94.0%	100.0%
Total	Count	2	2	96	100	
	% within group	2.0%	2.0%	96.0%	100.0%	

Chi square value: 2.042, P value: 0.360 (p=0.360, not significant)

Table 2 distribution of cases according to gravida in study group 25 (50%) patients were second gravida and in control group 24 (48%) patients were second gravida. There was no significant difference in gravida noted.

Table 3 show distribution of cases according to parity. In study group 26 (52%) patients were para one whereas in control group 25 (50%) patients were para one. There was no significant difference in parity noted.

Tables 4 and 5 show that the duration of third stage in study group ranged from 3.10-10.05 minutes with mean of 3.96 ± 1.36 minutes. Duration of third stage in control group ranged from 3.10-12.50 minutes with mean of 6.00 ± 2.12 minutes. In study group, duration of third stage was less than 6 minutes in 92% of patients whereas only 32% in control group. In 64% of control group patients third stage duration was 6-12 minutes whereas in study group only 8% patients had third stage duration of 6-12 minutes.

P value was <0.001 , in this study there was statistically significant difference in duration of third stage of labour between the study and control groups. Third stage duration was less in study group than control.

Tables 6 and 7 show that the amount of blood loss in third stage in study group ranged from 50-380 ml with mean 99.80 ± 56.47 ml.

Amount of blood loss in third stage in control group ranged from 50-540 ml with mean of 171.760 ± 96.94 ml.

P value was <0.001 , in this study we found there was statistically significant difference in amount of blood loss in third stage of labour in study and control groups. Amount of blood loss was less in study group than in control group.

Table 8 show that in study group the difference in haemoglobin levels before and after delivery was 0.39 gm/dl and in control group the difference was 0.75 gm/dl. P value was <0.001 , thus in this study we found that there was reduction of haemoglobin after delivery in both groups and drop in haemoglobin was almost double in control group.

Table 9 show that in study group only 2% of patient required blood transfusion, whereas in control group 6% of patients required blood transfusion. P value was 0.360. There was no significant difference seen in blood transfusion requirement in study and control group.

DISCUSSION

The third stage of labour starts from the interval from delivery of the fetus to the separation and expulsion of the placenta. The third stage of labour is a risky time as eventful, significant complications that threaten the mother's life can occur in this period. Although maternal mortality rates have declined dramatically in the

developed world, PPH remains a leading cause of maternal mortality especially in developing countries

Placental blood drainage is another method which could be advocated as a part of active management of third stage of labour.

Soltani et al, Sharma et al, Gulati et al all this study showed placental cord drainage is more effective in reducing the duration of third stage of labour.³⁻⁵ In similar study by Giacalone et al showed that the mean duration of third stage of labour in study group was 8 minutes and in control group was 15 minutes. Thus, he concluded duration of third stage of labour was significantly reduced in placental cord blood drainage group.⁶ Shrivage et al found the same results.⁷

The present study results pointed out that both blood loss and PPH incidence were lower among Placental cord drainage group than control. Afzal et al who concluded that the mean blood loss in placental cord drainage group was statistically lower compared to the other group ($p < 0.001$).⁸ Second, Meena et al, two Cochrane databases of systemic reviews, which are Hofmeyr et al and Begley et al studied the effect of placental cord drainage during the third stage of labour. All of them shown that placental cord drainage resulted in statistically significant reduction of blood loss during the third stage of labour.⁹⁻¹¹ Gulati et al in a study where they concluded that incidence of postpartum haemorrhage was 12% in control group and 6% in study group.⁵

In present study we found the difference in haemoglobin levels before and after delivery in study group was 0.39 gram/dl whereas in control group it was 0.75 gm/dl. Thus, drop in haemoglobin was almost double in control group (Table 8). This result was in line with the studies conducted by Giacalone et al, Meena et al, Mohamed et al, Roy et al, and Mohammed and Jeborry. All of them showed placental cord drainage significantly saves haemoglobin. They reported significance difference in postpartum haemoglobin level in placental cord drainage group than control group.^{6,9,12-14}

There were certain limitations in our study. Sample size being 50 in study group so the results cannot be generalised. Observer could not be blinded regarding the two methods of delivering placenta. This may bias the calculation of duration of third stage of labour and amount of blood loss in third stage of labour.

CONCLUSION

Placental blood drainage via umbilical cord reduces duration of third stage of labour and amount of blood loss in third stage of labour thereby preventing postpartum haemorrhage and its complications. Placental cord drainage should be encouraged for the management of third stage of labour universal to all pregnant women as it is simple, safe, non-invasive method and does not require

any extra effort, cost or equipment, extra training and is more relevant in low resource setting areas. Placental cord drainage helps in saving haemoglobin and thus decreasing the incident of anaemia and its complications.

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