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Original Research Article.

A Comparative Study of the Efficacy of the Intraumbilical & Intravenous Oxytocin in the Management of Third Stage of Labour

Indu Sharma[1], Manju Prabhakar[1*], Neerja[2], Raghav S.K.[3]

[1]Assistant Professor, [2]Professor, Department of Obstetrics & Gynaecology, Muzaffarnagar Medical College, Muzaffarnagar, Uttar Pradesh, India.
[3]Lecturer cum Statistician, Department of Community Medicine, Muzaffarnagar Medical College, Muzaffarnagar, Uttar Pradesh, India.

ABSTRACT

Objective: To compare efficacy of intra umbilical oxytocin with that of intravenous oxytocin for active management of third stage of labour.

Method: A randomized trial was undertaken in the department of obstetrics & Gynaecology Muzaffarnagar Medical College, Muzaffarnagar, in which two hundred patients were assigned in two groups. Group I received intraumbilical oxytocin 10 I.U. diluted in 10ml normal saline and Group II received intravenous oxytocin 10 units slowly after cord clamping in 3rd stage of labour. Outcomes were studied in form of blood loss and duration of 3rd stage of labour.

Results: Mean postpartum blood loss was 95.35ml in group I & 125.9ml in group II and mean duration of 3rd stage of labour was 1.703 min in group I & 2.53 min in group II respectively. The difference in duration & blood loss were statistically significant.

Conclusion: Intraumbilical oxytocin is more effective in comparison to intravenous oxytocin. Thus intraumbilical oxytocin is a safe and better alternative for AMTSL in Indian hospital setting.

Keywords: Oxytocin, Labour, Postpartum Blood Loss, Mortality.

Abbreviations:

IUO: Intraumbilical Oxytocin; **IVO:** Intravenous Oxytocin; **AMTSL:** Active Management of Third Stage of Labour; **PPH:** Postpartum Haemorrhage; **MMR:** Maternal Mortality Rate.

***Correspondence to:**

Dr. Manju Prabhakar,
Assistant Professor,
Department of Obstetrics & Gynaecology,
Muzaffarnagar Medical College,
Muzaffarnagar, Uttar Pradesh, India.

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INTRODUCTION

Obstetric haemorrhage is leading cause of maternal mortality causing 127,000 deaths per year worldwide.[1] India has MMR of 167/1,00,000 live births. Maximum no. of maternal deaths are due to PPH.[2] In 80-90% cases atonicity of the uterus is responsible for PPH. PPH is defined as blood loss of more than 500ml within 24hrs following child birth. Within 6wks of delivery it is called secondary PPH.

Nearly all deaths due to Postpartum haemorrhage are preventable. Every mother counts, no mother should die of preventable causes. We are committed to change from passive maternal death review to active 'maternal death surveillance & response' to bring down MMR.

The most common causes of postpartum haemorrhage are uterine atony, retained placental pieces, coagulation disorders, tears of birth canal, multiple pregnancy, large baby, age of mother < 18 or >40 years. Other causes may be anemia, obesity, hypertension, following LSCS, induction of labour, placenta previa, accreta, increta, percreta & episiotomy. A systematic review established that the risk of postpartum haemorrhage can be reduced by 60% when AMTSL is implemented. WHO recommend that AMTSL should be offered to all women who deliver with skilled birth attendant. The evaluation of individual components of AMTSL has focused on the use of uterotonic drugs.

Although WHO regards oxytocin as the gold standard for postpartum haemorrhage prevention, Oxytocin requires parentral route & several investigators think that the administration of oxytocin via the umbilical vessels significantly reduces the duration of 3rd stage of labour, 3rd stage blood loss & fall in hemoglobin in postpartum period. The routine practice in AMTSL is oxytocin 10 units I.V. given within 2 min after delivery of baby and action of onset is immediate & last for 1 hour.

Under the millennium development goals (MDGs), the MDG 5 target is to reduce maternal mortality ratio (MMR) by quarter between 1990 & 2015. This translates to reducing the MMR from 560 in 1990 to 140 in 2015. India is likely to reach an MMR of 140 if current compound rate of annual decline continue.

Table 1: Maternal Mortality Ratio

Major state	MMR(SRS) (2007-09)	MMR(SRS) (2010-12)	MMR(SRS) (2011-13)
India Total	**212**	**178**	**167**
Assam	390	328	300
Bihar	261	219	208
Jharkhand	261	219	208
MP	269	230	221
Chhattisgarh	269	230	221
Orissa	258	235	222
Rajasthan	318	255	244
Uttar Pradesh	359	292	285
Uttaranchal	359	292	285
Andhra Pradesh	134	110	92
Karnataka	178	144	133
Kerala	81	66	61
Tamil Nadu	97	90	79
Gujarat	148	122	112
Haryana	153	146	127
Maharashtra	104	87	68
Punjab	172	155	141
West Bengal	145	117	113
***Others**	160	136	126

Source: RGI (SRS 2007-09, 2010-12, 2011-13)[2]

India accounts for the maximum number of maternal deaths in the world - 17% or nearly 50,000 of the 2.89 lakh women who died as a result of complications due to pregnancy or childbearing in 2013. Despite India progressing noticeably in curling the maternal mortality rate (MMR) – 65% drop reported since 1990.

World health organization (WHO[3]) reported that India's MMR, which was 560 in 1990, reduced to 178 in 2010-12. However, as per the MDG mandate, India needs to reduce its MMR further down to 103. Postpartum haemorrhage (loss of blood after delivery) is one major cause of high maternal mortality rate in India.

This study is done to investigate how far the injection of 2 types of oxytocin (I.U.O. & I.V.O.) to the pregnant women will help in reduction of blood loss during delivery & it further attempts to make the comparison of the effectiveness of I.U.O. & I.V.O. in blood loss reduction. Which ultimately will lead to reduction of maternal mortality in the region.

MATERIALS AND METHODS

The present study was conducted at Muzaffarnagar Medical College, Muzaffarnagar, Uttar Pradesh, India.

200 women with a singleton pregnancy between 37-42 wks of gestation, anticipating a normal spontaneous vaginal delivery (with episiotomy), who were admitted to labour room & fulfilled our inclusion criteria chosen for the purpose of our study and were randomly divided into two groups of 100 each.

Inclusion Criteria

- The eligible patients were between 18-40yrs of age,
- Hemoglobin>9 gm/dl,
- Parity index <5.

Exclusion Criteria

- Hemoglobin<9 gm/dl,
- Grand multiparity (>5),
- Patients who required augmentation of labour,
- Patients with antipartum haemorrhage,
- Preeclampsia, eclampsia, gestational hypertension, other medical disorders including heart failure, cardiac disease, liver disease, lung pathology or coagulopathies, assisted vaginal deliveries, those with multiple pregnancies, polyhydroamnios & those undergoing caesarean section for various indications.

On admission to the labour ward, women were informed about the trial & written consent was obtained from those who accepted to be involved in the trial. A thorough general& systemic examination was done. A blood sample for haemoglobin estimation was obtained.

Group I: (100 women) – 10 units oxytocin diluted in 10ml normal saline injected intraumbilicaly immediately after cord clamping.

Group II: (100 women) – 10 units oxytocin injection slowly intravenously immediately after cord clamping.

In both groups placental delivery was conducted by controlled cord traction & uterine massage as a part of the standard of care. Injection delivery time of placenta & the 3rd stage duration was recorded using a stop-watch.

In both groups labour was actively monitored by partograph.

Blood loss was collected in bowl by firmly pressing the bowl against the perineum after the delivery of baby & was measured by measuring cup in ml. Gauges & pads were weighed before and after soakage (1ml of blood is equal to1 gram). Women were observed for two-hour post-delivery and all additional blood loss

was recorded. Baby's Apgar, weight, sex and weight of placenta noted. A second blood sample for haemoglobin estimation was obtained in the morning of Ist postpartum day to know any decrease. The mean duration of 3rd stage of labour and the mean blood loss was analyzed in relation to age, parity, duration of pregnancy, duration of labour, baby's weight. The level of significance was tested by z test. A p value of less than 0.05 was considered significant.

Table 2: Clinical and Demographic Variables

	Group 1	Group 2	p-value
Age (Years) [Mean Age+/-SD]	26.38+/-5.058	25.39+/-4.73	> 0.05NS 1.43NS
Gravidity	1.725+/-1.33	2.165+/-1.33	< 0.05S
Booked Patient	45	46	> 0.05
Unbooked Patient	55	54	
Gestational Age (Weeks) [Mean+/-SD]	38.25+/-0.87	38.31+/-0.889	> 0.05 0.476 NS

Table 3: Showing Mean Duration of Three Stages of Labour in Both Groups

	Group 1	Group 2	p-value
Mean Duration Of First Stage (Hrs) [Mean Age+/-SD]	7.528+/-1.09	7.458+/-1.194	> 0.05NS
Mean Duration Of Second Stage (Min) [Mean Age+/-SD]	18.56+/-8.165	18.34+/-8.40	< 0.05
Mean Duration Of Third Stage (Min) [Mean Age+/-SD]	1.703+/-0.918	2.53+/-0.765	> 0.00001 (S)

Table 4: Showing Duration of Third Stage of Labour in Group I & Group II

Time	Group I %	Group II %
< 1	4%	3%
1 to 2	60%	9%
2 to 3	12%	54%
3 to 4	18%	32%
> 4	6%	2%

Table 5: Showing Blood Loss in Third Stage of Labour in Group I & Group II

Volume (ml)	Group I	Group II	X^2 – test (p value)
< 50	5	2	p > 0.05 (NS)
50-100	65	5	p < 0.00001 (HS)
100-150	21	18	p > 0.05 (NS)
150-200	5	50	p < 0.00001 (HS)
>250	4	25	p < 0.00001 (HS)
	NO PPH	**NO PPH**	
	p = 0.00001 (Significant)		

Table 6: Showing Haemoglobin Levels At the Time of Admission And 24hrs after Delivery In Group I & Group II

Hb (gm%)	Group I (mean ± SD)	Group II (mean ± SD)
At the time of admission	11.91+/-0.91	11.80+/-0.88
After delivery	11.80+/-0.78	11.64+/-1.03
Fall in Hb %	0.11+/-0.13	0.16+/-0.15
Z value	- 1.257	-1.651
P value	0.210 (NS)	0.100 (NS)

OBSERVATION & RESULTS

The present study was conducted on 200 term pregnant women admitted to labour room in Muzaffarnagar Medical College, Muzaffarnagar from January 2017 to December 2017. Of the 200 participants 100 received intraumbilical oxytocin & 100 received intravenous oxytocin for AMTSL. Base line demographic and clinical variables were similar across both the groups (Table 2).

As seen in the table 3; the two groups were comparable in terms of duration of first & second and third stage of labour.

As shown in table 4; maximum no. of patients i.e. 60 in group I had duration of 3rd stage of labour between 1 to 2 min, 54 patients in group II had duration of 3rd stage of labour between 2 to 3 min. 18 patients in group I & 32 patients in Group II had duration of 3rd stage of labour between 3 to 4 min. 6 patients in group I & 2 patients in group II had duration of 3rd stage of labour more than 4 min. The mean duration of 3rd stage was lower in group I (intraumbilical oxytocin) 1.703+/-0.918 Min than Group II (Intravenous oxytocin) 2.53+/-0.76 Min. The difference was statistically significant (P = 0.00001).

Maximum no of patients i.e. (65%) in group I had amount of blood loss between 50-100ml. 50% patients in group II had blood loss between 150-200ml. 21 patients in group I, 18 patients in group II

had blood loss between 100-150ml. 5% patients in group I & 50% patients in group II had blood loss between 150-200ml. 4 patients in group I & 25 patients in group II had blood loss more than 250ml. More ever, less no. of patients in group I (5 patients) & in group II 2 patients had blood loss less than 50ml.

The mean amount of blood loss in third stage of labour was 95.35+/-51.15 in group I & in group II mean amount of blood loss was 190.6+/-77.13. No patient in any group had PPH. As shown in table 6; the mean haemoglobin at the time of admission were similar in group I (11.91+/-0.91) & group II (11.80+/-0.88) and the difference was not statistically significant. After delivery haemoglobin (11.80+/-0.78) in group I & (11.64+/-1.03) in group II. The fall in haemoglobin % (0.11+/-0.13) was lesser in group I as the blood loss than in group II (0.16+/-0.15). However the difference was not statistically significant ($p<0.05$).

DISCUSSION

This study found that blood loss, duration of 3rd stage of level & drop in haemoglobin level were lesser in intraumbilical oxytocin group in comparison to the intravenous oxytocin group.

Table 7: Comparison of Duration of 3rd Stage of Labour in Various Studies

Author	Year	Group I	Group II
Ojha et al	2007	3.6 min	
Shreshtra et al	2003	5.42 min	6.02
Deshpanda et al	2015	1.29 min	4.32 min
Godha z al	2016	1.85	
Present study	2016	1.703 ± 0.918	2.53 ± 0.76

The duration of 3rd stage of labour in intraumbilical oxytocin in group in our study was 1.703±0.918min. Shreshtra et al 2003[5] found that mean duration third stage of labour was 5.42 mins & 3.6 mins respectively in intraumbilical oxytocin which was higher than present study. Manhas et al 2012[10], Makvandi et al 2013[6], Godha et al 2016[10] found on their study of intraumbilical oxytocin the mean duration of third stage of labour was 3.17 mins, 3.50 mins, 1.85 mins respectively which was higher than the present study. Deshpande et al 2015[8] found than the mean duration of the third stage of labour with intraumbilical oxytocin was 1.29 mins which was less than the present study & comparable to present study. He also found on their study that the mean duration of third stage of labour with intravenous oxytocin was 6.02 mins and 4.32 mins respectively which was higher than the present study.

The mean blood loss in the third stage of labour was 95.35 ± 51.15 ml in study group I & in group II it was 125.9 ± 54.768 ml. The difference in the blood loss in two groups was statistically significant ($P < 0.00001$).

Kore S et al 2000[9] found in their study with injecting intravenous oxytocin which was more than that found in the present study. Shreshtra P et al 2003[5] found in their study with intravenous oxytocin which was reduced as compared with present study.

Choudhari et al 2012[11], Lamba et al 2013[12], Godha et al 2016[7] and Shreshtra et al 2003[5] found in their study that amount of blood lost in injection oxytocin intramuscular which was more than that found in the present study, moreover Ojha N et al 2015[4], Kaudel S et al 2005[13] found that blood lost was reduced as compared with the present study and which was comparable to present study.

In the present study it was found that there was a drop in haemoglobin from the time of admission & after delivery in group I (0.11gm/dl) $p = 0.21$ & in group II drop in haemoglobin was (0.16gm/dl) $p = 0.10$. The difference was not statistically significant.

Ghulmayyah et al 2007[14], Manhas A et al 2012[10], Kaudel et al 2015[13] and Godha Z et al 2016[7] found that fall in haemoglobin which is higher as compared to present study. No case of PPH was found in present study with either of the two groups.

Guillermo et al 1998[15], found significant reduction in the incidence of postpartum haemorrhage with intra-umbilical oxytocin. No case of PPH was found in the present study in the intra-umbilical oxytocin group. Ojha et al 2007[4] found the incidence of PPH with intra-umbilical (8.3%) and intramuscular oxytocin (3.4%), however no case of PPH was found in the present study.

CONCLUSION

Postpartum haemorrhage is an important cause of maternal mortality in India. Managing the 3rd stage of labour properly can reduce the incidence of postpartum haemorrhage & hence the maternal mortality.

In this study of active management of 3rd stage of labour by injecting 10 units of oxytocin injection diluted in 10ml of saline after the delivery of the baby, but before the delivery of placenta. It was found that besides being a simple, safer, non-invasive, inexpensive & easy method. It requires no special skill on the part of obstetrician. It effectively reduces the blood loss during 3rd stage & reduces the duration of 3rd stage of labor as compared to intravenous oxytocin injection. It appears to be safe, useful & practical method for the active management of 3rd stage of labor. 3rd stage complications as postpartum hemorrhage & retained placenta are not common in this group.

There is no significant side effect on maternal & neonatal health. So it can be recommended for the routine use to check complications like retained placenta and postpartum hemorrhage. Further large scale studies with more number of patients are needed to confirm these findings & mature recommendations.

Thus it is good option specially for developing tropical countries like India where most of the deliveries are conducted at peripheral, rural centres by a nurse, midwife or a trained dai.

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