International Journal of Reproduction, Contraception, Obstetrics and Gynecology
Agarwal M et al. Int J Reprod Contracept Obstet Gynecol. 2023 Nov;12(11):3317-3321
www.ijrcog.org
pISSN 2320-1770 | eISSN 2320-1789

DOI: https://dx.doi.org/10.18203/2320-1770.ijrcog20233301

Original Research Article

A comparative study of efficacy of intramuscular PGF2alpha and intramuscular oxytocin in management of third stage of labour

Manju Agarwal, Saroj Kumari Meena*, Sushma

Department of Obstetrics and Gynecology, Jhalawar Medical College, Jhalawar, Rajasthan, India

Received: 02 September 2023
Revised: 15 October 2023
Accepted: 16 October 2023

***Correspondence:**
Dr. Saroj Kumari Meena,
E-mail: sarojmeena15M6417@gmail.com

ABSTRACT

Background: The third stage of labour is most crutial stage begins with expulsion of baby and end with expulsion of placenta and membranes. The present study was conducted to evaluate the scope of using prophylactic intramuscular carboprost tromethamine in comparison with intramuscular oxytocin for active management of third stage of labor.
Methods: Patients were divided randomly into 2 groups 39 in each group. Patients assigned to group 1 received 10 units oxytocin IM and group 2 received carboprost 125 µg IM after delivery of anterior shoulder of baby. The main outcomes measured were duration of third stage of labor, mean amount of blood loss, additional oxytocic requirement, HB changes in group and side effects of drug which were used in each group.
Results: Subjects who received carboprost showed a significant reduction in duration of third stage of labor (P= 0.041), amount of blood loss (P=0.046) and requirement of additional oxytocic compared to the subject who received oxytocin 10 units.
Conclusions: Carboprost 125µg is better alternative compared to injection 10 units oxytocin in the prophylactic management of third stage of labor.

Keywords: Active management of third stage of labour, Carboprost, Oxytocin

INTRODUCTION

The third stage of labour is the most crutial stage begins with expulsion of baby and ends, with expulsion of placenta and membranes. Its average duration is 15 minutes in both primigravida and multigravida. The duration is however reduced to 5 minute in active management. Active Management of third stage of labour is to excite powerful uterine contraction within one minute of delivery of baby (WHO). By giving powerful oxytocics this facilitate not only early separation of the placenta but produce effective uterine contraction following its separation and also reduces the duration of third stage of labour. This includes early cord clamping, controlled cord traction during placental separation and immediately administration of prophylactic oxytocics.[1]

Several compounds can be used to prompt the postpartum uterus to contract. One of these is routinely selected and given to prevent postpartum bleeding. Choices for prophylaxis includes oxytocin, the ergots, namely ergonovine(Ergotral) and methyl ergonovine (Methergine) or misoprostol and second line agents like E and F series of prostaglandins.[2]

The WHO (2018) recommended Oxytocin for first line use for prophylaxis. 20 units of oxytocin in 1000 ml of crystalloid solution is effective and given intravenously at the rate 10ml/min for a dose of 200mU/min (2012).[3] If

bleeding and atony are refractory, an agent from a different group can be added (American college of obstetrician and gynaecologists, 2019a).[4] Carboprost tromethamine is the 15 methyl derivative of prostaglandin F2α. It is approved for uterine atony treatment in a dose of 250 µg given IM. This dose can be repeated if necessary at 15-90 minutes interval upto maximum of 8 doses. Observational data indicates an 88% success rate.[5] Carboprost cause side effects in approximately 20% women. These includes, in descending order of frequency diarrhea, hypertension, vomiting, fever, flushing, and tachycardia.

Another pharmacological effect is pulmonary airway and vascular constriction. Thus, carboprost should not be used for asthmatic women or those with suspected amniotic fluid embolism. Other relative contraindication to carboprost include renal, liver and cardiac diseases. (American college of obstetrician and gynaecologists, 2019a).[4]

Aims of this study were to compare the effectiveness of intramuscular oxytocin 10 units and intramuscular carboprost tromethamine (125µg) in prophylaxis of postpartum haemorrhage and to evaluate the side effect.

METHODS

A prospective cross sectional study was conducted in Smt. Heera Kunwar Ba Mahila Hospital, Jhalawar Medical College over 78 pregnant women. Data was collected from their history, examination and investigation.

Study period

The study was carried out from 01st March 2023 to 31st March 2023.

Inclusion criteria

Women in age group of 20-35 year, singleton pregnancy, gestational age >37 weeks with vertex presentation and women willing for participation.

Exclusion criteria

Women not willing for participation, cardiac, renal, respiratory, endocrinal diseases and coagulation disorders, sensitivity to PG's, lower segment caesarean section, gestational hypertension, pre-eclampsia, eclampsia, gestational diabetes, abnormal presentations, multiple gestation,women in age group <20 and >35 year were excluded.

Method to measure amount of blood loss

The soiled linen and sponges used were weighed. The known dry weight was substracted from the weight of socked sponges. The weight of 1gm equals to 1ml.

RESULTS

The study was performed on 78 cases with 39 in each group. Patients assigned to group 1 received 10IU oxytocin intramuscularly and group 2 received carboprost 125µg intramuscularly after the delivery of anterior shoulder of baby.

Table 1: Distribution of cases in each group.

	Group 1	Group 2
Agent	Oxytocin	Carboprost
Number	39	39

Table 2: Distribution of cases according to age of participants.

Group	Mean age (years)	SD	T value	P value
Oxytocin	32.36	5.21	0.2595	0.7960
Carboprost	32.02	6.31		

Descriptive statistical tools like mean and proportion were used to calculate the data. Student t test and Chi square test were used to compare the efficacy of two drugs.

Table 3: Distribution of cases according to parity.

Parity	Oxytocin	Percentage	Carboprost	Percentage	Total	percentage	Chi sq	P value
Primi	23	58.97	19	48.71	42	53.84		
Multi	16	41.02	20	51.28	36	46.15	0.825	0.3637
Total	39	100	39	100	78	100		

Mean maternal age in oxytocin group was 32.36±5.21 years and in carboprost group was 32.02±6.31 years. The difference was not found to be statistically significant (P value =0.7960).

Oxytocin was given in (58.97%) primi and (41.02%) in multipara. Carboprost was given in (48.71%) primi and (51.28%) in multipara. There was no statistically significant difference between two groups (P=0.3637).

In our study, there was statistically significant (P=0.041) association between duration of third stage of labor and use of oxytocics. The maximum number of women (53.84%) in oxytocin group had duration of third stage of labor ranging between 6-10 minutes and in caboprost group (56.41%) women had duration ranging between 1-5 minutes.

Table 4: Distribution of cases according to duration of III stage of labor.

Duration of III stage labor	Group				Total	Percentage	Chi sq	P value
	Oxytocin	Percentage	Carboprost	Percentage				
1-5 min	11	28.20	22	56.41	33	42.30		
6-10 min	21	53.84	13	33.33	34	43.58		
>10 min	07	17.94	04	10.25	11	14.10	6.367	0.041*
Total	39	100	39	100	78	100		

Table 5: Comparison of mean amount of blood loss (ml) in two groups.

Amount of blood loss	Oxytocin	Percentage	Carboprost	Percentage	Total	Percentage	Chi sq	P value
<100 ml	01	2.56	04	10.25	05	6.41		
100-300 ml	18	46.15	27	69.23	45	57.69		
301-500 ml	11	28.20	06	16.66	17	21.79		
>500 ml	09	23.07	02	5.12	11	14.10	9.525	0.023*
Total	39	100	39	100	78	100		

Table 6: Comparison of additional oxytocics requirement in two groups.

Additional requirement of oxytocics	Group				Total	Chi sq	P value
	Oxytocin	%	Carboprost	%			
Required	09	23.07	02	5.12	11		
Not required	30	76.92	37	94.87	67	5.186	0.022*
Total	39	100	39	100	78		

There was significant association was found between blood loss and use of oxytocics (P=0.023). According to percentage, maximum number of women (69.23%) had low blood loss (100-300ml) who received carboprost as compare to oxytocin (46.15%). The amount of blood loss >500ml was observed in (23.07%) women who received oxytocin and (5.12%) in carboprost.

Number of patients who required additional uterotonics in oxytocin group were more (23%) compared to carboprost group (5.12%). Additional oxytocic in the form of misoprostol (PGE1) was provided. The difference was statistically significant (P =0.022).

There was reduction of postpartum hemoglobin in both the groups. Mean difference in group 1 was 0.76 g/dl and group 2 was 0.38g/dl. The difference in reduction Hb between 2 groups was statistically significant (p<0.0001).

Table 7: Comparison of hemoglobin changes in two groups.

Group	Mean Changes in HB (g/dl)	SD	T value	P value
Oxytocin	0.76	0.16		
Carboprost	0.38	0.12	11.865	<0.0001*

Table 8: Comparison of side effects.

Side effects	Oxytocin	%	Carboprost	%	Chi sq	P value
Nausea	2	5.12	2	5.12		
Vomiting	1	2.56	1	2.56		
Shivering	1	2.56	0	-		
Diarrhea	0	-	3	7.69	4.95	0.29
Headache	1	2.56	0	-		
Total side effects	5	12.82	6	15.38		
Total	39	100	39	100		

Women in group A had nausea (5.12%) as common side effect and other side effect were vomiting, shivering and headache. Women in group B had common side effect of diarrhea (7.69%) and other side effects were nausea and vomiting. There was no statistically significant difference between two groups (P=0.29).

DISCUSSION

Postpartum hemorrhage is one of the most important cause of maternal death throughout the world. Everyday about 1500 women dies from pregnancy and child birth related complications.[6]

The primary aim in the management of PPH should be its prevention. Active management of the third stage with routine prophylactic administration of oxytocics at the time of delivery of the anterior shoulder of the fetus has been shown to reduce the risk of postpartum hemorrhage by about 40 %.[7,8]

Routine use of active management of third stage of labour for all vaginal singleton births in health facilities is recommended by the International Federation of Gynaecologist and Obstetrician (FIGO) and the International Confederation of midwives (ICM) as well as by WHO.[9,10] Various drugs and routes of administration have been tested with varying success. Oxytocin is probably the most commonly used oxytocic and has been well known in midwifery for a long time. Though commonly used it is not the potent drug and many a times requires additional drugs and blood loss is more compared with other drugs.[11] Carboprost tromethamine (PGF2a) is a powerful uterotonic agent with a physiological role in human parturition both in the delivery of the fetus and control of postpartum bleeding. The discovery of prostaglandins and their analogues as uterotonics has improved the management of PPH due to their significant influence on uterine tone, which results in minimizing the blood loss; this outweighs its cost. The side effects are also subtle.[12,13] Hence this study was conducted at Jhalawar medical college to evaluate the two uterotonic drugs.

In our study, mean maternal age in oxytocin group was 32.36±5.21 years and in carboprost group was 32.02±6.31 years. The difference was not found to be statistically significant (P value =0.7960). In other study which was conducted by Madhulika et al shows that the mean maternal age in oxytocin group was 26.23±4.16 years and in carboprost group was 25.51±0.98.[14]

In our study, oxytocin was given in (58.97%) primi and (41.02%) in multipara. Carboprost was given in (48.71%) primi and (51.28%) in multipara. There was no statistically significant difference between two groups (P=0.3637).

In our study, there was statistically significant (P=0.041) association between duration of third stage of labor and use of oxytocics. The maximum number of women (53.84%) in oxytocin group had duration of third stage of labor ranging between 6-10 minutes and in caboprost group (56.41%) women had duration ranging between 1-5 minutes. In other study which was done by Tuvar et al shows that mean duration of third stage of labor was less in carboprost (5.54 minute) than oxytocin (9.12 minute).[15]

In our study, there was significant association was found between blood loss and use of oxytocics (P=0.023). According to percentage, maximum number of women (69.23%) had low blood loss (100-300ml) who received carboprost as compare to oxytocin (46.15%). The amount of blood loss >500ml was observed in (23.07%) women who received oxytocin and (5.12%) in carboprost. In other study which was conducted by Kumar et al showed that the amount of blood loss in majority of subject were less with carboprost (170.2ml) than oxytocin (281.05ml).[16]

In our study, number of patients who required additional uterotonics in oxytocin group were more (23%) compared to carboprost group (5.12%). Additional oxytocic in the form of misoprostol (PGE1) was provided. The difference was statistically significant (P =0.022). Study which was conducted by Patil et al observed that in oxytocin, additional requirement of oxytocic (21%) is more compared to Carboprost (4%).[17]

There was reduction of postpartum hemoglobin in both the groups. Mean difference in group 1 was 0.76 g/dl and group 2 was 0.38g/dl. The difference in reduction Hb between 2 groups was statistically significant (p<0.0001).

In other study conducted by Tuvar et al the difference in Hb in oxytocin group was 0.86/dl and in carboprost group was 0.46 g/dl.[15]

Carboprost in therapeutic dose (250 µg) has been reported to be effective in 84-96% in the treatment of PPH and may avoid the need for surgical intervention.[9]

In our study women in group A had nausea (5.12%) as common side effect and other side effect were vomiting, shivering and headache. Women in group B had common side effect of diarrhea (7.69%) and other side effects were nausea and vomiting .there was no statistically significant difference between two groups (P=0.29).

In other study conducted by madhulika et al.[14] Nausea was seen in (8%) cases in oxytocin group and diarrhea was seen in (16.40%) cases of carboprost.

The limitation of our study is that it is done at single center with a relatively smaller population and duration of study was small. Thus, results may not be applicable to other populations.

CONCLUSION

Our study concludes that carboprost 125µg is better alternative compared to injection oxytocin 10 units and more effective in active management of Third stage of

labour. Carboprost efficiently decreases the duration of third stage of labour, and reduces the amount of blood loss and less requirement of additional uterotonics.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Dutta DC. Normal Labour. Textbook of Obstetrics. 10th ed. Jaypee Brothers: Medical Publisher; 2021:132-134.
2. Cunningham FG, Leveno KJ, Dashe JS, Hoffman BL, Spong CY, Casey BM. Williams Obstetrics. 26th ed. McGraw Hill; 2022:1906.
3. World Health Organisation. WHO recommendations: uterotonics for the prevention of postpartum haemorrhage, 2018. Available at: https://www.who.int/publications/i/item/9789241550420. Accessed DD MMM YYYY.
4. Adewumi RR. American College of Obstetricians and Gynecologists Postpartum Hemorrhage Protocol (Doctoral dissertation, Walden University). Practice Bulletin No.183, 2017.
5. Oleen MA, Mariano JP. Controlling refractory atonic postpartum hemorrhage with Hemabate sterile solution. Am J Obstet Gynecol. 1990;162(1):205-8.
6. Lamba A, Joshi G, Gupta M. Role of carboprost in prevention of postpartum hemorrhage. Inter J Reprod Contracep Obstet Gynecol. 2016;5(7):2151-5.
7. Begley CM, Gyte GM, Devane D, McGuire W, Weeks A, Biesty LM. Active versus expectant management for women in the third stage of labour. Cochr Data System Revi. 2019;11(2):CD007412.
8. International Confederation of Midwives, International Federation of Obstetrics and Gynecology. Prevention and reatment of post-partum hemorrhage. New advances for low resource settings. Int J Gynecol Obstet. 2007;97:160.
9. Buttino L Jr, Garite TJ. The use of 15 methyl F2 alpha prostaglandin (Prostin 15 M) for the control of postpartum hemorrhage. Am J Perinatol. 1986;3(3):241-3.
10. Management of the third stage of labour to prevent post-partum haemorrhage (joint statement). The Hague and London: International Confederation of Midwives and International Federation of Gynaecology and Obstetrics, 2003.
11. Patel A, Goudar SS, Geller SE, Kodkany BS, Edlavitch SA, Wagh K, et al. Drape estimation vs visual assessment for estimating postpartum haemorrhage. IJOG. 2006;93(3):220-4.
12. Kamalajayaram V, Devi ED. Prophylactic PGF2a for control of postpartum bleeding a comparative study with methyl ergometrine. J Obstet Gynaecol India. 1994;44:393-7.
13. Anjaneyulu R, Pk D, Jain S, Cr K, Vijaya R, Ks R. Prophylactic use of 15 (5)methyl PGF2a by IM route-A controlled clinical trial. Acta Obstet Gynecol Scand Suppl. 1988;67(S145):9-11.
14. Madhulika DS, Rai S. Comparison of carboprost with oxytocin in third stage of labour. Inter J Clin Obstet Gynaecol. 2019;3(5):318-21.
15. Tuvar V, Chavda K, Chavda DA. Carboprost verses oxytocin in active manageent of third stage of labour. IJSR. 2016;7(10):1383-5.
16. Sunil Kumar KS, Shyam S, Batakurki P. Carboprost versus oxytocin for active management of third stage of labor: a prospective randomized control study. J Obstet Gynecol India. 2016;66(S1):229-34.
17. Patil AS, Dadavate V, Thobbi VA. Carboprost versus oxytocin for active management of third stage of labour. Al Ame J Med Sci. 2016;9(3):196-201.

Cite this article as: Agarwal M, Meena SK, Sushma. A comparative study of efficacy of intramuscular PGF2alpha and intramuscular oxytocin in management of third stage of labour. Int J Reprod Contracept Obstet Gynecol 2023;12:3317-21.