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Carboprost Versus Oxytocin in Active Management of Third Stage of Labour: Comparative Study

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Methodology: Three hundred obstetric cases anticipated for spontaneous vaginal delivery were randomly divided into two groups. Out of which 150 received Intramuscular oxytocin 10 units and 150 cases received Intramuscular Carboprost 125 µg after the delivery of the baby.

The main outcome measured with respect to outcome of third stage of labor were: duration, blood loss by volume, difference in hemoglobin, need for additional oxytocics and side effects.

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Carboprost Versus Oxytocin in Active Management of Third Stage of Labour: Comparative Study

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The main outcome measured with respect to outcome of third stage of labor were: duration, blood loss by volume, difference in hemoglobin, need for additional oxytocics and side effects.

Results: Carboprost group had shown significant reduction in duration of third stage of labour ($p<0.001$), blood loss ($p<0.001$) and reduction in hemoglobin was also less when compared to oxytocin. Most of oxytocin group side effects like nausea and vomiting (6%) while diarrhea (12%) was common among carboprost group.

Conclusion: The study concludes that intramuscular carboprost 125 µg is more effective in active management of third stage of labour. However, a large metacentric randomized controlled trial is required to draw conclusion.

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I. Background

Third stage of labour is the period from the delivery of the baby until the delivery of the placenta(1). Active management of third stage of labour involves; routine administration of a prophylactic uterotonic drug just before, with, or immediately after, the birth of the baby; early cord clamping and controlled cord traction to deliver the placenta(2). According to WHO the most common complication of third stage of labour is Postpartum hemorrhage (PPH) which is defined as a blood loss of at least 500ml after vaginal delivery and 1000ml after cesarean section and/or necessity of postpartum blood transfusion within 24hours of delivery(3,4).

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Drugs conventionally used for prophylaxis against PPH includes oxytocin, methylergotmetrin, carboprost and syntometrin(5). Among them Oxytocin acts through receptor and voltage mediated calcium channels to initiate myometrial contractions. It is on the World Health Organization's List of Essential Medicines, the most effective and safe medicines needed in a health system (6). In other hand Carboprost It shortens induction to delivery interval. Carboprost being a prostaglandin promotes myometrium contraction irrespective of the duration of gestation, whereas oxytocin acts predominantly on the uterus at term or in labour.

The present study is an attempt to evaluate the scope of using carboprost tromethamine 125 µg which is half the therapeutic dose for PPH and to evaluate its efficacy in terms of amount of blood loss, duration of third stage, side effects in comparison with oxytocin 10 units in active management of third stage of labor.

II. Methodology

This study was a hospital based comparative study, conducted at National Medical College and Teaching

Hospital, Birgunj, Nepal which is a tertiary level hospital. The study period was twelve months from 16th July 2018 to 15th June, 2019. Ethical clearance was taken from institutional Review board (IRB) of National Medical College. Convenient Sampling method was used for sampling.

This study includes 300 women with singleton pregnancy with cephalic presentation in labor at term (3742 weeks of gestation). Excluding the women who underwent caesarean section, hypersensitivity to drugs, underlying comorbidity like respiratory diseases (asthma), cardiac disease, renal, liver disorder, epilepsy, psychiatry disorder, preeclampsia and eclampsia, severe anemia, multiple pregnancy, Polyhydramnios/ Oligohydramnios, Past History of PPH, Grand Multipara. These women are recruited in two group after taking informed consent with standardized form after admission in labor ward. Women who were likely to have vaginal delivery were offered entry to the trial with computer generated random numbers, to either control group to receive intramuscular oxytocin 10 units (group

A) or to the study group to receive intramuscular carboprost 125μg(group B) just after the delivery of the baby. A sterile tub is immediately placed at the vulva after delivery of fetus and blood volume was measured by measuring jar. Differences in the weight of drapes and sanitary pads was also estimated by weighing it before and after delivery and converting it into grams per milliliter. It is done by dividing difference in weight of drapes along with sanitary pads with density of blood (i.e 1gm/ml)(7).Estimated total blood loss was calculated by adding the 2 values. If intravenous oxytocin infusion was used during the second stage of labour, it was stopped immediately after delivery. The drape was removed 10 minutes after the episiotomy or laceration repair unless the patient continued to have significant PPH. Patients were further monitored for 1 hours postpartum for PPH and side effects of drugs.

III. Data Analysis and Statistical Analysis

The data collected were entered daily in the master chart. Pre-test of data was done after completing 10 cases and necessary adjustment were made after discussing with the guide. Regular meetings with guide were held to clear up any confusion. Analysis of the data was done. Data were summarized as mean and proportion with the help of the statistician and the final analysis was done using independent t test to test the difference between the 2 different groups. Paired data were analyzed using paired t test. Chi-square test was used to analyze the difference in proportions, and p values were reported accordingly. These findings were then presented in the form of tables, graphs and diagrams. P value was considered significant if $p < 0.05$. SPSS version 21 was the software used for calculation and tabulation of data.

IV. Result

The study population included 300 obstetric cases fulfilling inclusion and exclusion criteria. Out of which 150 received Intramuscular oxytocin 10 units and 150 cases received Intramuscular Carboprost 125μg just after the delivery. The age group ranged between 15-42 years. The mean age group of oxytocin group was 22.85±3.34 years and that of carboprost group was 25.29±4.07 years.101 and 131 women belongs to age group 21-35 years among oxytocin and carboprost groups respectively.

Duration of third stage of labour in oxytocin group ranges from 4-12 minutes and mean duration was 5.57±1.20454. In Carboprost group, the duration ranges from 4-11 minutes with mean duration of 4.85±0.84 .The difference in mean duration of third stage between two groups was 0.72. Intergroup comparison of both study groups showed p value of <0.001 which is statistically significant.

There was reduction of hemoglobin in both the groups. In oxytocin group difference in hemoglobin was 1.49 gm/dl while in carboprost group was 0.78gm/dl.

Comparison of Blood Loss in Study Groups

Blood loss range(ml)	Oxytocin n(%)	Carboprost n(%)
<100	0(0.00%)	41(27.33%)
101-150	0(0.00%)	31(20.66%)
151-200	29(19.33%)	53(35.33%)
201-250	37(24.66%)	18(12%)
251-300	49(32.66%)	2(1.33%)
301-350	31(20.66%)	2(1.33%)
351-400	2(1.33%)	0(0.00%)
401-500	0(0.00%)	1(0.66%)
>500	2(1.33%)	2(1.33%)

The above table shows distribution of both the groups according to amount of blood loss. The postpartum blood loss was less in carboprost group compared to oxytocin group which was statistically significant (p value<0.001) and 2 cases went into PPH in Both groups.

Comparison of Estimated Total Blood Loss

Groups	Total Blood Loss(ml)	
Oxytocin	269±61.83	P<0.001
Carboprost	156±80.01	

The above table shows comparison of blood loss between two groups. The blood loss in Oxytocin group was 269±61.83 compared to carboprost group which was 156±80.01 with p value of 0. 001. Intergroup comparison showed that the mean difference in estimated total blood loss between study groups was 113 with p value of 0.001 which was statistically significant.

In oxytocin group 26 0ut of 150 i.e. 17.3% required additional uterotonics whereas in carboprost group 9 out of 150 i.e. 6.0% required additional uterotonics. The difference in usage of additional uterotonics was statistically significant (p=0.002).

Women in oxytocin group had side effects like nausea and vomiting (6%), shivering (3.33%) and retained placenta (0.66%) while carboprost group had side effects like nausea and vomiting (7.3%), diarrhea (12%) and retained placenta (1.33%).

V. Discussion

This study was conducted in department of obstetrics and gynecology, at National medical college and teaching hospital to evaluate the two uterotonics for management of third stage of labor. 300 women were selected who fulfilled the selection criteria and they were divided in group A and group B 150 of each by computer generated random numbers. In this study we evaluated the efficacy of oxytocin 10 units (group A) with Carboprost 125μg (group B) in the third stage of labour and also recorded duration and blood loss in third stage of labour along with side effects and need for additional uterotonics.

Postpartum hemorrhage has been considered one of the most dreadful cause of maternal mortality worldwide with uterine atony being most common cause (70-90%). Active management of third stage of labour and prophylactic use of oxytocics after the delivery of baby has reduced its incidence by 40% (8,9). Main aim is to prevent PPH.

While it is clear that the use of prophylactic uterotonics will substantially reduce PPH , the most cost effective and ideal uterotonics has not been found, although intramuscular oxytocin is recommended by WHO .Methyl ergometrine is a conventional oxytocics used extensively but with hypertension as side effect. Intramuscular oxytocin has been found effective in preventing PPH even when used alone with fewer side effects. Oxytocin is probably the most commonly used oxytocic but is not the most potent drug and additional dosage or additional drugs may be needed at times with more blood loss compared to other oxytocics(10).

Carboprost is a strong uterotonic agent with a physiological role in human parturition both in the delivery and control of PPH. The discovery of prostaglandins and its analogues as an oxytocics has improved prospect in modern era in control of PPH due to its significant influence on uterine tone resulting in less blood loss that outweighs its cost. The side effects are also subtle(11,12).

VI. Conclusion

In our conclusion, our study favors that intramuscular carboprost 125μg is a better and cost-effective option compared to intramuscular oxytocin 10U and more effective in AMTSL. Carboprost minimized blood loss significantly with less need for additional uterotonics and effectively shortened the duration of third stage of labor compared to oxytocin. The result of our study demonstrated that prophylactic dose of carboprost is well tolerated and may be considered in all woman at risk of PPH. However, a large multicentric randomized controlled trial is required to draw conclusion.

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