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# Intra-umbilical Oxytocin versus Methyl Ergometrine in the Third Stage of Labor: A Comparative Study from an Egyptian Tertiary Care Hospital

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## Abstract

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Recently, the active management of the third stage of labor has become a routine practice. In this study we compared two different ecobolics which were oxytocin and methyl ergometrine through intra-umbilical route. The method: the trial divided the included pregnant full term (>37 weeks) women in two groups randomly; one for 0.2 mg methyl ergometrine and the second 10 units oxytocin. The outcomes were on the short term; estimated blood loss (EBL), the need to add another ecobolic, vomiting, blood pressure changes and the duration of the third stage, and the long-term outcomes were hemoglobin levels and the need for surgical or medical uterine evacuation. The results: the mean blood loss was  $155 \pm 50.45$  ml and  $167 \pm 45.76$  in the methyl ergometrine and the oxytocin groups respectively. Three cases in the oxytocin group (3%) required additional methyl ergometrine while in the ergometrine group only one case was given an additional oxytocin (1%). No vomiting was reported in both groups and there were trivial changes in blood pressure. In the oxytocin group, the third stage duration was average  $3.03 \pm 1.02$  min in comparison to  $2.98 \pm 1.54$  min in the ergometrine group. Neither did those cases who were injected methyl ergometrine have significant changes in the hemoglobin levels nor did they need uterine evacuation. However, only one case in the oxytocin side required blood transfusion due to uterine atony. Conclusion: intra-umbilical methyl ergometrine should be considered as an effective safe ecobolic in the third stage of labor.

**Keywords:** Third stage, ecobolics, postpartum hemorrhage, intra-umbilical, oxytocin, ergometrine.

## Introduction

### **Postpartum hemorrhage**

MBRRACE (mother and baby reducing risks through audit and confidential enquiries) declared that there is a potentially concerning, although non-significant, 99% increase in maternal deaths from hemorrhage (95% CI 4% decrease–392% increase).<sup>1</sup> This is due to a small increase in the number of deaths of women with abnormal placentation. Consequently, it is imperative that there should be a definitive protocol for early recognition and prevention of the consequences of third stage abnormalities.<sup>2</sup>

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### Third stage of labour

Placental delivery in the third stage of labor has three successive steps; (1) placental separation as a result of discordant surface of attached placenta to contracting uterine surface, (2) placental descent owing to uterine contraction and (3) finally placental expulsion and bleeding bed controlled by contracting uterus. That means myometrial contractions leads to effective uterine contractions to deliver the placenta and stop bleeding. In other words, active management is a valid prophylactic intervention to prevent third stage complications for example; postpartum hemorrhage or retained placenta.<sup>3</sup> It is conceivable that an ideal ecobolic should have a dual action; contract the uterus to deliver the placenta and stop the bleeding.

According to the recommendations in NICE (national institute of clinical excellence in the UK) for intrapartum care 2014 updated 2017 that third stage is the period after delivery of the baby and before delivery of the placenta that should be no more than 30 minutes in case of active management and 60 minutes if passive management was used. In order to prevent the risks of bleeding and the need for blood transfusion active management is offered to shorten the third stage and to avoid these side effects of passive management where no ecobolics use, no controlled cord traction and delivery of the placenta by maternal effort.<sup>4</sup> Although benefits of active management by oxytocin 10 IU intramuscularly, deferring cord clamping followed by controlled cord traction (CCT) outweighs its side effects of nausea and vomiting, woman wish not to actively managed her third stage should be respected especially in low risk cases. However, she should be offered all the information she needs about both methods and the increase risk of bleeding and retained placenta and membranes in the passive method.<sup>4</sup>

From a comparison point of view, it is noted that ergometrine is considered as a versatile uterotonic in third stage causing sustained uterine contractions but it also acts on all smooth muscles in the body particularly in-

testinal muscles. Consequently, the reported nausea and vomiting after ecobolics in third stage were apparently related to ergometrine use and not with oxytocin which works only on uterine muscles.<sup>3</sup> Moreover, a growing body of research recommends avoiding the use of ergometrine in hypertensive patients or vascular diseases (migraine, Raynaud's).<sup>5</sup>

### Research Hypothesis

Two questions were asked; what the difference would be if injected locally intra-umbilical and what is the mechanism behind the possible reduced mean blood loss and duration of the third stage of labor with the use of intra-umbilical vein injection of oxytocin or ergometrine?

This may be due to the fact that an ecobolic agent injected into the umbilical vein reaches the placental bed in relatively high concentrations. This stimulates uterine contractions, thus decreasing the area of the placental attachment site. The resulting tension causes the decidua spongiosa to give way with the formation of a hematoma. This accelerates the process of placental separation and expulsion, thus resulting in a shorter duration of the third stage of labor and a smaller amount of blood loss

### Materials and method

**Type of study:** randomized prospective comparative study was conducted between January 2019-January 2020

**Population:** 200 women who delivered vaginally in labour ward at Mansoura University hospital after thorough history and detailed examination. Labor in all recruited women was spontaneous with no induction or augmentation during labor. Management of third stage was active and no passive management included.

**Inclusion criteria:** women aged 25 to 35 were included in this study their blood groups were Rh +, parity two or less, body mass index (BMI) less than 30, and singleton pregnancy with cephalic presentation.



**Exclusion criteria:** no risk factor for bleeding; no previous history of bleeding or blood transfusion, no medical comorbidities; hypertension or diabetes, no prolonged labor, no fever, no premature rupture of membrane history.g

### **Ethical Considerations**

Institutional Ethics Committee approval was obtained. Consent was obtained from women who participated in the sample. They were reassured about the confidentiality of the information. They were informed about their rights to refuse participation or withdraw at any time. The study maneuvers couldn't entail any harm to participation.

The study groups: Group 1 included women who received methyl- ergometrine 0.2 mg in 10 ml saline slow intra-umbilical injection over one minute after delivery of the baby. Group 2 was for women who received injection Oxytocin 10 IU in 10 ml saline within one minute after delivery of the baby. Injection was done through neonatal aspiration catheter along the umbilical vein. The Catheter was hold in place by finger pressure all around to prevent back flow. Then milking of the cord towards the placenta was carried out.

The delivery was conducted with the patient at the edge of the table and 10 IU of injection Oxytocin intramuscular were given at the delivery of anterior shoulder of the baby according to NICE recommendation. Once the baby is delivered, apex of the episiotomy was sutured. Placenta is delivered by controlled cord traction and time taken for placental separation was noted with a stopwatch. Controlled cord traction was done by clamping the cord close to the perineum and held in one hand, the other hand is placed above the pubic symphysis and the uterus is stabilized

by applying counter pressure. Slight tension is kept on the cord awaiting a strong uterine contraction (2 - 3 min). During the third stage, blood loss for one-hour duration was collected in a clean dry container fixed to the tail end of the delivery table and then measured in a graduated jar. <sup>6</sup>

The outcomes were on the short term; estimated blood loss EBL, the need to add another ecobolic, vomiting, blood pressure changes and the duration of the third stage, and the long-term outcomes were hemoglobin levels and the need for surgical/medical uterine evacuation or blood transfusion.

### **Analysis**

**Tools of data collection:** One tool was used for data collection.

**A Structured Interviewing Questionnaire Schedule:** It was designed by the researchers after reviewing related literatures. It consisted of:

**Part I:** to assess general and obstetrics characteristics including age, parity, gestational age, level of education.

**Part II:** to assess duration of placental delivery and need for manual delivery of placenta, side effects of ecobolics used and measurement of the amount of blood loss through collection of blood in calibrated container. Complete blood count to assess hemoglobin level before and 6 hours after labor.

### **Results**

There were no significant differences in the studied demographic characteristics; age, parity, BMI, gestational age in weeks, and hemoglobin level at delivery and neonatal birth weight.

**Table 1:** Shows women demographic criteria and baseline data.

	<b>Group 1 ergometrine (n. 100)</b>	<b>Group2 oxytocin (n. 100)</b>	<b>P value</b>
<b>Age</b>	26.92± 2.55	25.19± 3.02	0.604
<b>Parity Primigravida Para 2</b>	<b>55 (55%) 45 (45%)</b>	<b>58 (58%) 42 (42%)</b>	0.726
<b>BMI (BODY MASS INDEX) at booking</b>	26.45± 3.55	26.19±4.06	0.590
<b>Hemoglobin level before delivery</b>	10.85±1.34	10.65± 1.89	0.223
<b>Gestational age in weeks at delivery</b>	39.87±0.67	38.84±0.39	0.213
<b>Neonatal birth weight</b>	3.21±0.43	2.99±0.55	0.059

Estimated blood loss (EBL), the need to add another ecobolic, vomiting, blood pressure changes and the duration of the third stage as short-term outcomes demonstrated no statically significant difference among the two studied groups.

**Table 2:** Illustrates the short-term outcomes

	<b>Group 1 ergometrine (n. 100)</b>	<b>Group2 oxytocin (n. 100)</b>	<b>P value</b>
<b>Duration of third stage</b>	2.98± 1.54	3.03± 1.02	0.304
<b>Blood pressure Systolic Before delivery After delivery</b>	125.76±5.13 125.54±5.45	124.96±6.95 123.54±7.85	0.476
<b>Diastolic Before delivery After delivery</b>	75.30±4.90 76.60±4.89	77.10±3.60 74.05±2.97	0.396
<b>EBL</b>	155± 50.45	167± 45.76	0.456
<b>Vomiting</b>	0	0	
<b>Need for secondary eco- bolic</b>	1 (1%)	3(3%)	0.281

In regard of long-term outcomes; hemoglobin levels and the need for surgical/medical uterine evacuation or blood transfusion were not different significantly (P value < 0.05)

**Table 3:** Delineates the long-term outcomes

	<b>Group 1 ergometrine (n. 100)</b>	<b>Group2 oxytocin (n. 100)</b>	<b>P value</b>
<b>Hemoglobin level</b>	9.98±1.54	9.83±1.32	0.205
<b>Uterine evacuation Medical</b>	0	0	
<b>Surgical</b>	0	0	
<b>Blood transfusion</b>	1	2	0.284



## **DISCUSSION**

Labor is critical time in a woman life. One of the most leading causes for maternal mortality in developing countries is bleeding in the 3rd stage. Various uterotonics used in active management of third stage of labor like oxytocin, methyl ergometrine and prostaglandins. 7 Despite of the powerful effect of ergometrine as an ecobolic, it has gastrointestinal side effects. 8

In this prospective randomized trial, we compared different route of administration; intra-umbilical for both ergometrine and oxytocin to overcome these systemic side effects. Recently, oxytocin has been recommended as the ecobolic of choice in active management of third stage. Consequently, the rate of postpartum hemorrhage has been found to decrease owing to the implementation of this protocol in practice. However, the use of oxytocin may not be superior to ergometrine particularly in a case of atonic postpartum hemorrhage. There are uncertainties about type, dose, route of administration of ecobolic drugs that provide the better safety profile and efficacy. 9

A randomized study in 2008 reported less blood loss in ergometrine group than oxytocin when administered intravenously after delivery of anterior shoulder;  $149.33 \pm 145.47$  and  $196.57 \pm 192.30$  respectively.  $P=0.003$ . 10 Using the intra-umbilical route in our study had no difference between the two agents in amount of blood loss;  $155 \pm 50.45$  for ergometrine group and  $167 \pm 45.76$  for oxytocin group.  $p=0.456$

Orji, E et al 2008, 6.9% of women had retained placenta in ergometrine group and 4.1% in oxytocin group but no retained placenta in our study. There were three cases that needed further ecobolic doses in the oxytocin group versus one case extra-dose in the ergometrine group. 10

A running clinical trial in the UK (IMox) investigates three different ecobolics via intra-muscular route. 11 In this study, we changed the route to be intra-umbilical to avoid the generalized smooth muscle effect of ergometrine in order to compete with other ecobolics. The proposed route had been used with oxytocin

in retained placenta management but technical obstacles prevented the routine use. 12 Herein study, the method adopted from Pipingas et al 1993. 13 It was a trial and error experience that can be adapted according to the local protocols and facilities.

Limitation of the study was the small sample size and restricted options. In other words, the next study would aim to include more groups with variable ecobolics; for example: Carbetocin or Syntometrine to extend the options available.

## **Conclusion**

In this study, the results agree with previous data that both oxytocin and ergometrine proved to be effective in preventing postpartum hemorrhage. These agents have been used in various doses and routes with variable success. This study showed that intra-umbilical route is viable option that should be considered.

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