

Islam Hassan..Delayed Cord Clamping

By Islam Hassan Ibrahim Mohamed Salem

Delayed Cord Clamping Compared with Immediate Cord Clamping to Increase Placental Transfusion in preterm neonates: A Randomized Controlled Trial

Thesis

*Submitted for partial fulfillment of the M.D degree
in Obstetrics and Gynecology*

By

Islam Hassan Ibrahim Mohamed Salem

*M.B.B.Ch (2008), M.Sc. (2013), Obstetrics and Gynecology
Assistant lecturer - Faculty of Medicine - Ain Shams University*

Under Supervision of

Prof. /Ayman Abdelrazek Abulnour

*Professor of Obstetrics & Gynecology
Faculty of Medicine - Ain Shams University*

Prof. /Sherif Fikry Hendawy

*Professor of Obstetrics & Gynecology
Faculty of Medicine - Ain Shams University*

Prof. /Safaa Shafik Imam

*Professor of Pediatrics & Neonatology
Faculty of Medicine - Ain Shams University*

Dr. / Ahmed Mohamed Bahaa Eldin Ahmed

*Assistant Professor of Obstetrics and Gynecology
Faculty of Medicine - Ain Shams University*

**Faculty of Medicine
Ain Shams University**

2016



Acknowledgement

Before all,

I would like to express my profound gratitude to **Prof. /Ayman Abdelrazek Abulnour** Professor of Obstetrics and Gynecology, Faculty of Medicine, Ain Shams University, for his valuable advises and support all through the whole work and for dedicating much of his precious time to accomplish this work.

I am also grateful to **Prof. /Sherif Fikry Hendawy** Professor of Obstetrics and Gynecology, Faculty of Medicine, Ain Shams University, for his continuous encouragement and supervision and kind care.

I am also grateful to **Prof. /Safaa Shafik Imam** Professor of Pediatrics & Neonatology, Faculty of Medicine, Ain Shams University, for her supervision and kind care.

Last but not least I would like to express my thanks and gratitude to **Dr./Ahmed Mohamed Bahaa Eldin Ahmed**, Assistant Professor of Obstetrics and Gynecology, Faculty of Medicine, Ain Shams University, for his continuous encouragement and supervision and kind care.



Islam Hassan Ibrahim

Contents

List of Abbreviations	i
List of Tables	ii
List of figures	iii
Introduction and Aim of the Work	1
Review of Literature	4
Preterm birth	4
Cord Clamping	10
Neonatal Anemia	14
Patients and Methods	17
Results	24
Discussion	36
Summary	41
Conclusion and Recommendations	44
References	46
Arabic Summary	--

List of Abbreviations

AAP	American Academy of Pediatrics
ACOG	American College of Obstetricians and Gynecologists
ART	Assisted Reproductive Technology
Hb	Hemoglobin
Hct	Hematocrit
HS	Highly significant
ILCOR	International Liaison Committee on Resuscitation
IVH	Intraventricular hemorrhage
NEC	Necrotizing enterocolitis
NICU	Neonatal intensive care unit
NS	Non-significant
PFT	Placento-fetal transfusion
PPROM	Premature prelabor rupture of membranes
RBC	Red blood cell
RBS	Random blood sugar
RCM	Royal College of Midwives
S	Significant
SD	Standard deviation
WHO	World Health Organization

List of tables

<i>Table</i>	<i>Title</i>	<i>Page</i>
1	Maternal age and gestational age among groups	24
2	Medical and obstetric maternal characteristics among groups	27
3	Neonatal complications among groups	30
4	Neonatal complications among groups	32
5	Vaginal deliveries and cesarean sections in the immediate cord clamping study group regarding neonatal laboratory data	33
6	Vaginal deliveries and cesarean section in the delayed cord clamping study group regarding neonatal laboratory data	34

List of Figures

<i>Fig.</i>	<i>Title</i>	<i>Page</i>
1	A display of the cervical effacement process	6
2	Maternal age and gestational age among groups	25
3	Gender distribution in study population	26
4	Mode of delivery in both groups	29

Introduction

Preterm birth is known to be the main cause of morbidity and mortality in infants, reaching to up to 18% of pregnancies (*Romero et al., 2014*). Attention has been gained to preterm infants rather recently. The main reason behind this is the underreporting and lack of proper surveillance systems to collect data on these neonates as well as long-term studies that follow-up the complications of these infants (*Beck et al., 2010*). Anemia in the preterm remains an obstacle to growth and leads to malnutrition after birth especially if the infant is hospitalized for a prolonged period of time (*Yasmeen et al., 2015*). Iron is also necessary for nerve myelination and neurotransmission which are essential for brain development (*Andersson et al., 2011*). In light of this, several studies arose regarding benefit of delayed cord clamping with regards to the well-being of preterm infants (*Bayer, 2016; Brocato et al., 2016*).

Based on these studies, international consensus on recommendations for delayed cord clamping arose including the World Health Organization, (*WHO, 2014*), the Royal College of Midwives Guideline Advisory Group (*RCM, 2015*), the American College of Obstetricians and Gynecologists (ACOG), endorsed by the American Academy

Introduction and Aim of the Work

of Pediatrics (AAP) (*ACOG, 2012*), and the International Liaison Committee on Resuscitation (ILCOR) (*Perlman et al., 2010*) arguing for the benefits of deferred cord clamping. Despite these recommendations, concerns exist regarding delaying cord clamping. The increase in blood volume and red cell mass may result in neonatal polycythemia, increased blood viscosity, and exacerbation of jaundice.

Although many studies have been carried out, real-life practices have not been consistent on performing immediate or delayed clamping of the cord. This is due to a number of reasons including a discrepancy in the exact timing of clamping the cord (*ACOG, 2012*), studies that have shown uncertainty in benefits, and the necessity of immediate resuscitation (*Duley et al., 2015*). In Egypt, there is no strict national guideline or recommendation to practice deferred cord clamping over the immediate method.

In this study, our primary objective was to compare the hematocrit and hemoglobin values in preterm infants (34-37 weeks). Ultimately, through our results, we aim to enhance PFT in preterm neonates and establish consistent national policies within our hospitals for the short and long benefit of infants.

Aim of the Work

To compare Delayed & immediate Cord Clamping to enhance placent-fetal blood transfusion in preterm neonates by measuring hematocrit & hemoglobin after one hour and after 6 weeks.

Preterm Birth

Preterm birth (Latin: partus praetemporaneus or partus praematurus) is known as a baby born before 37 weeks of gestation. It is often used interchangeably with the term “premature birth”; however, premature birth is also a terminology that annotates the birth of a baby with immature organs that cannot allow the neonate to naturally survive on its own after birth (*Goldenberg et al., 2008*). Preterm birth is known to be the main cause of morbidity and mortality in infants, reaching to up to 18% of pregnancies (*Romero et al., 2014*). These preterm births are either extremely preterm (born before 28 weeks gestation), very preterm (between 28 to 31 weeks), moderate preterm (at 32 or 33 weeks gestation), or late preterm (born between 34 to 36 weeks of gestation). The distribution of preterm infants is known to be as follows: 5% for extremely preterm, 10% very preterm, and as much as 85% are moderate to late preterm (*Torchin et al., 2015*).

Attention has been gained to preterm infants rather recently; this is especially true in low-middle income countries as Egypt. The main reason behind this is the underestimation of the problem due to underreporting and

lack of proper surveillance systems to collect data on these neonates as well as long-term studies that follow-up the complications of these infants (*Beck et al., 2010*).

More than 50% of all neonatal deaths were at risk of mortality due to the fact that they were born preterm. In addition, one million neonates die directly from preterm complication annually. It is important to prevent the birth of preterm infants. However, this requires early confirmatory diagnosis which is currently unavailable (*Beck et al., 2010*). However, fetal breathing movements and transvaginal sonographic cervical length measurements and shapes can help in diagnosis of onset of spontaneous labor (*Honest et al., 2012*). Through transvaginal sonography, the letters T, Y, V, and U seen by transvaginal sonography were best used by Zilianti et al. to draw a close description of the phases of cervical effacement. These shapes represent the positions of the cervix in relation to the lower uterine segment (Fig.. 1) (*Zilianti et al., 1995*). At term, this diagnostic method is not as of high value since a 10 mm or less can predict delivery within 7 days (*Saccone et al., 2016*). The main role of fetal fibronectin in diagnosis is to reduce unnecessary healthcare interventions and optimize resources (*Deshpande et al., 2013*).

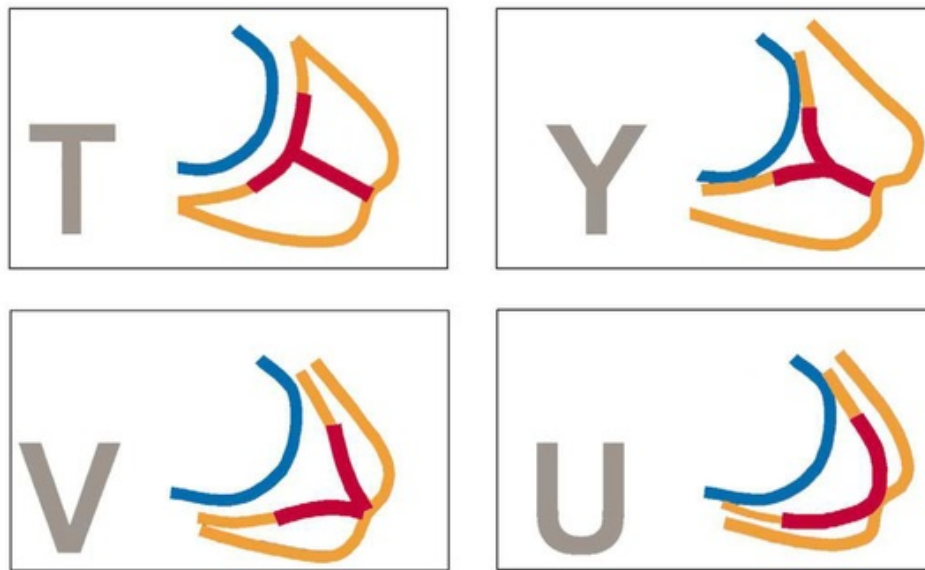


Fig. (1): A display of the cervical effacement process

(Zilianti et al., 1995).

*Gray: cervical configuration;
Blue: fetal head
Orange: cervix
Red: cervical change

It is also possible to determine the probability through a number of multifactorial risk factors including: maternal history of preterm delivery, primiparity, multiple pregnancies (*Jakobsson et al., 2008*), old age of mother (*Tepper et al., 2011*), preeclampsia, infections of the genitals (including bacterial vaginosis), congenital abnormalities, assisted reproductive technology (ART) (*Blumenshine et al., 2010*), smoking, and obesity (*McDonald et al., 2010*). Interestingly,

Review of Literature

socioeconomic influences, including maternal occupation and education, also have a role in early delivery (*Blumenshine et al., 2010*). However, there is no definite etiology. Bacterial vaginosis, especially aerobic vaginitis, is one of the causes of genital infections that can lead to preterm deliveries (*Krauss-Silva et al., 2014*). Although bacterial vaginosis is associated with preterm deliveries, it is not advised to prescribe antibiotics routinely for mothers that do not suffer from infections and have intact membranes. This can have dire consequences on the baby as this affects their neurological development (*Royal College of Obstetricians and Gynaecologists, 2013*).

Adverse outcomes of prematurity ranges from short-term to long-term complications. The short-term complications naturally occur during the neonatal period and usually consist of cardiovascular and respiratory complications. Long-term repercussions occur after the infant is discharged from the neonatal intensive care unit (NICU) and can be presented with neurodevelopmental disabilities. These outcomes get worse when the gestational age is lowest and there is no immediate care of high quality (*Eichenwald and Stark, 2008*) (*Blencowe et al., 2013*).

Review of Literature

Not to mention, these outcomes, albeit short-term or long-term, pose an economic burden due to the ongoing medical and healthcare liabilities (*Blencowe et al., 2013*).

Although there is no agreed method in the prevention of preterm labor, several strategies have been studied. Empiric use of tocolytics, cervical cerclage and limited movement with bed rest have not proved success (*Lim et al., 2011*). Tocolytics merely provide an abolishment of contractions, but they do not treat the actual cause or stimulus that resulted in the acute early contractions (*Rameez et al., 2013*). Progesterone has been reported to suppress the ripening of the cervix, inhibit uterine contractions, and modulate inflammatory reactions. Results in a systematic review in 2016 demonstrated that mothers of high risk of preterm labor at <37 weeks gestation had a reduced risk of preterm birth with pessary and progesterone. With mothers of high risk of preterm labor at <34 weeks gestation, progesterone was the most effective method of prophylaxis, yet it as not statistically significant (*Jarde et al., 2016*).

Adverse effects of progesterone include local irritation. The optimal route of administration has been recommended as weekly of 17 a-hydroxyprogesterone caproate for women