Effect Of Deferred Cord Clamping on Respiratory Function In Neonates delivered Preterm: Randomized Controlled Trial

A Protocol of Thesis

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List of abbreviations

ACOG— American College of Obstetricians and Gynecologists
AMTSL—Active management of third stage of labor
BW—birth weight
CVS—cardiovascular system
CNS—central nervous system
CTG —cardiotocography
CC—cord clamping
CPAP—continuous positive airway pressure
DCC —Deferred cord clamping
ECC —early cord clamping
ENC —early neonatal care
EUPHRATES—the European Project on obstetric Hemorrhage Reduction: Attitudes, Trial, and Early warning System
FHR—fetal heart rate
FRC—functional residual capacity
FIGO—International Federation of Obstetrics and Gynaecology
GA—gestational age
GDM—gestational diabetes mellitus
GIT—gastro intestines
HB—hemoglobin
Hct—Haematocrit
HIV—human immunodeficiency virus
ICM—International Confederation of Midwives
ICEA—International Childbirth Education Association
ID—iron deficiency
IUGR—intra-uterine growth restriction
IM —intramuscular
IU —intrauterine
IV— intravenous
ILCOR—the Inter-national Liaison Committee on Resuscitation
MD—mean difference
MCV—mean cell volume
NICU— neonatal intensive care unit
NEC— necrotizing enterocolitis
PROM—premature rupture of membranes
PTL—preterm labor
PIH— pregnancy induced hypertension
PPV—positive pressure ventilation
PPH—postpartum hemorrhage
RH—Rhesus factor

RBCs—red blood cells
RDS—respiratory distress syndrome
RR—relative risk
RCOG —Royal College of Obstetricians and Gynecologists
ROC— Receiver operating characteristic
SD—standard deviation
SJMHS—Saint Joseph Mercy Health System
SPSS— Statistical Program for Social Science
TS— transferrin saturation
T3— triiodothyronine
USA—United States of America
VDCC —ventilation with delayed cord clamping
VLBW— Very low birth weight
WHO—World Health Organization

protocol

Introduction

The optimal timing of clamping of the umbilical cord after birth have been a subject of controversy and debate. Although many randomized controlled trials in term and preterm infants have evaluated the benefits of delayed umbilical cord clamping versus immediate umbilical cord clamping the ideal timing of umbilical cord clamping has yet to be established (***ACOG, 2012).***

Delayed cord clamping (DCC) is a practice by which the umbilical cord is not clamped or cut until after it stops pulsating. It may also include not clamping or cutting the umbilical cord until after the placenta is delivered. Many studies do not include the actual timing of the DCC; however it can range from 30 seconds to 180 seconds. Some say there are insufficient data to determine whether there is any additional benefit of waiting beyond 60 seconds ***(Raju, 2013).***

The optimal timing of umbilical cord clamping has been the subject of a large number of studies, randomized controlled trials and meta-analyses. In most births, delay of cord clamping can take place if all involved in the birthing process agree. Delay cord clamping would be contraindicated in cases where the newborn is in need of immediate resuscitation ***(ACOG, 2012).***

In the early 19th century, the English physician, Erasmus Darwin mentioned "another thing very injurious to the child is the tying and cutting of the navel string too soon, which should always be left till the child has not only repeatedly breathed but till all pulsation in the cord ceases, as otherwise the child is much weaker". However, the timing of cord clamping continues to vary according to clinical policy and practice, though surveys of cord clamping practices in a variety of settings and countries indicate that early cord clamping is more frequently practiced. ***(WHO, 2014)***.

As a consequence the umbilical cord is usually clamped soon after delivery of the baby. The observation that the cord can contain up to 20 mL of blood raised the possibility of delaying clamping to allow placental transfusion to the baby. One of the major advantages could be to increase the circulating volume and hemoglobin level. The benefits of the former include less respiratory distress and reduced need for later transfusions ***(*Joseph, *2014).***

In contrast, some suppose that "Transient tachypnea of the newborn may occur as a result of delayed absorption of lung fluid caused by an increase in blood volume related to delayed cord clamping. Although Cernadas et al. found a slight increase in respiratory rate in those infants who experienced delayed cord clamping; no additional respiratory therapy was needed for these infants ***(Cernadas, et al., 2006)***. McDonald and Middleton found that both the delayed and immediate clamping groups had a similar number of infants admitted to any level of neonatal intensive care unit for respiratory distress (RR, 1.01; 95% CI, 0.18–5.75; n = 1008) ***(McDonald, et al., 2008)***. Overall, the data concerning the relationship between respiratory distress and delayed cord clamping are inconclusive ***(Gina and goanna, 2009)***.

Overall, the available evidence appears to suggest that DCC is likely to result in better neonatal outcomes in both term and preterm infants. However, there is insufficient evidence to date to support a recommendation as regards the impact of DCC on respiratory function in preterm baby to delay cord clamping in non-vigorous infants requiring resuscitation ***(Milena and Haim, 2012)***.

Aim of the Work

This study aims to evaluate the effect of deferred cord clamping on respiratory function in preterm neonates born vaginal.

Research Hypothesis:

In preterm neonates deferred cord clamping may have effect on respiratory function and decrease oxygen requirements.

Research Question:

In preterm infants does deferred cord clamping affect respiratory function ?

PATIENTS AND METHODS

Study design: This is randomized controlled trial.

Study Settings: the study will be carried out at Ain-Shams university maternity hospital.

Study Duration: The duration of the study is expected to be 6 months.

Study Population: Pregnant women (age 20-35 years old) are going to have spontaneous preterm birth vaginal from 34-36^{+6} weeks.

All cases in this study will be included according to the following criteria:

Inclusion criteria:

1- age 20-35 years old.

2-GA 34-36^{+6} weeks.

3- spontaneous PTL.

Exclusion criteria:

Any maternal or fetal condition associated with the need of immediate neonatal resuscitation as:

1- High risk pregnancy like hypertension (PIH), gestational diabetes mellitus (GDM), pre-eclampsia and placental insufficiency (cyanotic heart disease, pulmonary disease).

2- Infants with antenatal diagnosis of congenital malformations of any system (CVS, GIT, RENAL, CNS, RESP) .

3- Fetal distress.

4- Multiple gestation.

5- Fetal illness(fetal hydrops, Rhesus sensetization, IUGR).

6- RH negative pregnant.

7- PROM(premature rupture of membranes).

Saple size calculation: was conducted using Epi-save software to conduct a comparative clinical trial to detect difference of effects of delayed **cord clamping on respiratory function in preterm neonates born vaginal.** Using previous study as reference. New York State 57 Normal full-term infants born vaginally without any perinatal complications to study respiratory frequency, pattern and occurrence of expiratory grunting from birth through the first hours of life after stopping of cord pulsation (mean, 3 min 48 s [range, 2.5-5 min); newborns placed 10 cm below level of introitus ***(Eileen and eman, 2007)***.

Sample size was estimated to be **50 subjects in each group, totally 100 neonates included in the study** to detect reduction in incidence of tachypnea among the studied neonates from 20% (Ref) to 5% by using delayed cord clamping (15% reduction of incidence).

The estimated sample size is made at assumption of 95% confidence level and 80% power of study.

OpenEpi | Start | Enter | Results

Sample Size for Cross-Sectional, Cohort, & Randomized Clinical Trial Studies

Two-sided significance level(1-alpha):	95
Power(1-beta, % chance of detecting):	80
Ratio of sample size, Unexposed/Exposed:	1
Percent of Unexposed with Outcome:	20
Percent of Exposed with Outcome:	5
Odds Ratio:	0.21
Risk/Prevalence Ratio:	0.25
Risk/Prevalence difference:	-15

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Sample Size - Exposed	37	35	38
Sample Size-Nonexposed	37	35	38
Total sample size:	74	70	76

Study method

All women will be subjected to:

The approval of the local ethics committee of our hospitals and oral consent of the patient will be required and all patients will be subjected to full medical history, Clinical examination.

A) history:

- **Personal history:**

  Name (Optional), age, occupation and residence.

- **Complaint and present history.**

- **Past history:**

Chronic maternal illness (hypertension, cardiomyopathies, chronic renal disease, and haemoglobinopathies).

Includes previous complicated pregnancy, previous abortions, previous preterm, DM, hypertension, cardiovascular disease, liver disease and pulmonary disease.

- **Family history:**

includes history of congenital anomalies in the family, hypertension or diabetes.

- **Obstetric history:**

Gestational age, any complications with current pregnancy includes PIH, gestational diabetes, any diagnosed congenital malformations, fetal hydrops, IUGR and suboptimal CTG.

B)Physical examination:

- General (Vital signs, including fundal hieght, abdominal and pelvic grip).
- Abdominal examination.
- Local examination.