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### ORIGINAL ARTICLE

# Early versus delayed cord clamping of term births in Shatby Maternity University Hospital



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#### KEYWORDS

Early cord clamping;  
Delayed cord clamping;  
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#### Abstract

**Background:** The optimal timing for cord clamping; early versus delayed in the third stage of labour, is a controversial subject. There are no formed practice guidelines.

**Objective:** To compare the potential benefits and harms of early versus late clamping in term infants in Shatby Maternity Hospital.

**Methods:** A randomized study was conducted on 100 primigravide full term single pregnancy admitted and delivered spontaneously at Shatby Maternity University Hospital. They were divided into two groups (each 50) where in the first group the umbilical cord was clamped immediately “early cord clamping” (ECC) and where the 2nd group the umbilical cord was clamped after pulsation had been ceased “delayed cord clamping” (DCC) and then Apgar score, Hemoglobin level, random blood sugar, oxygen saturation and bilirubin after 72 h of labour of newborn were compared and analyzed.

**Results:** There was no statistical significant difference between both groups as regards Apgar score, haemoglobin, Random blood sugar and bilirubin while, there was a statistical significant difference as regard O<sub>2</sub> saturation.

**Conclusion:** Delayed cord clamping is likely to result in better neonatal outcome.

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#### PALABRAS CLAVE

Pinzamiento precoz  
del cordón;  
Pinzamiento tardío  
del cordón;  
Cordón umbilical

**Pinzamiento precoz frente a pinzamiento tardío del cordón umbilical en nacimientos a término del Hospital Materno-Infantil de Shatby**

#### Resumen

**Antecedentes:** El momento óptimo para el pinzamiento del cordón umbilical, precoz frente al tardío durante el expulsivo del parto, es un tema polémico. No existen unas directrices prácticas formales.

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**Objetivo:** Comparar los beneficios y daños potenciales del pinzamiento precoz frente al tardío en recién nacidos a término en el Hospital Materno-Infantil de Shatby.

**Métodos:** Estudio aleatorizado de 100 embarazos únicos a término en primigrávidas que ingresaron y dieron a luz de manera espontánea en el Hospital Materno-Infantil de Shatby. Quedaron divididas en 2 grupos (de 50 integrantes cada uno) en los que se realizó un pinzamiento precoz del cordón umbilical en el primero y un pinzamiento tardío del cordón umbilical en el segundo. A las 72 h del parto se compararon y analizaron la puntuación de Apgar y los valores de hemoglobina, glucemia aleatoria, saturación de oxígeno y bilirrubina.

**Resultados:** No se apreció una diferencia estadística significativa entre ambos grupos con respecto a la puntuación en el test de Apgar, ni tampoco en los valores de hemoglobina, glucemia aleatoria y bilirrubina, si bien existió una diferencia estadísticamente significativa con respecto a la saturación de O<sub>2</sub>.

**Conclusión:** Un pinzamiento tardío del cordón umbilical podría derivar en un mejor resultado neonatal.

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## Introduction

Clamping and cutting of the umbilical cord at birth is by far the oldest and most prevalent in humans.<sup>1</sup> In spite of that, the optimal timing of cord clamping has been a controversial for decades.<sup>2</sup>

Active versus physiological management of the third stage is generally accepted as an evidence-based plan for women to avoid excessive blood loss; clamping and cutting the umbilical cord following birth has continued to be routine part of this focus.<sup>2</sup>

There are no formal practices guidelines, but most practitioners in western countries clamp and cut the cord immediately after birth, while the practice worldwide is variable. The active management of the third stage of labour includes: oxytocin administration, early cord clamping and controlled cord traction.<sup>2</sup>

Early cord clamping as a part of the active management is usually performed within the first 30 s at birth, regardless of whether cord pulsations have ceased or not. Some researchers define “immediate” cord clamping as cutting the cord within 5 second, but this definition is not widely used.<sup>2</sup>

Advantages of early clamping are prevention of potential postpartum hemorrhage possibility for prompt treatment of the new born, and harvesting of stem cells, while the potential disadvantage of this approach is the increased likelihood of feto-maternal transfusion because early clamping may force blood back to the placenta and increase the likelihood of a D-antigen (rhesus) negative mother to be sensitized by her D-positive infant.<sup>2</sup>

Delayed clamping allows time for transfusion of placental blood to the newborn infant, which can provide the neonate with an additional 30% blood volume, thereby protecting him from anemia without increasing the risk of jaundice and complications related to hyper viscosity and polycythemia.<sup>3</sup>

This — relatively — low cost intervention that can decrease the prevalence of iron deficiency anemia in childhood which is a serious worldwide problem affecting infants in developing countries.<sup>4</sup>

In addition, circulation from the placenta persists for a few minutes after birth and the infant continues to get oxygen through umbilical cord. When oxygen-rich blood is

allowed to course through the intact cord, the newly born infant is offered a protected time of adjustment to his new world and his new way of breathing.<sup>5</sup>

On other hand delayed cord clamping has been identified as a cause of polycythemia which leads to hyperviscosity<sup>5</sup>; 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.<sup>6</sup>

So the aim of this work was to compare the potential benefits and harms of early versus late umbilical cord clamping in Shatby Maternity Hospital, Alexandria University.

## Methods

A randomized study was carried on 100 pregnant women admitted to the obstetrics and gynecology department in Shatby Maternity University hospital from the June 2014, where the parents were informed about the trial and obtained informed consent before were obtained birth. The randomization was performed with a system of randomly prepared cards in sealed non-transparent envelopes containing early or delayed cord clamping when the birth was imminent. The inclusion criteria of this trial include primigravida, full term, non-complicated pregnancy, single, spontaneous delivery with average first and 2nd stage labor, optimums time of rupture of membrane and average fetal weight. While pregnancy with Rh—ve group mother, twins, history of postpartum hemorrhage, preterm, congenital anomalies, instrumental delivery, prolonged labor, patient under general anesthesia, cord around the neck necessitating early cutting and in need of early resuscitation were excluded from the trial. Fifty early cord clamped newborn infants within 30 s (group I) were compared to fifty delayed cord clamping after cord stopped pulsation (group II), then Apgar score, Hb%, random blood sugar, O<sub>2</sub> saturation by the oxymetry (Masimo SET<sup>®</sup> pulse oximetry) immediately after delivery and also bilirubin level after the 3rd day of delivery were assessed by the paediatrician. The data was collected and entered into personal computer. Statistical analysis was done using statistical package for social sciences (SPSS/version 20) software. Arithmetic mean standard deviation and the *t*-test were used for comparison between the two groups. The level of significant was 0.05.

## Results

After analysis of the data of study, there was no statistically significant difference regarding baseline data or in mean value of the Apgar score at 1 and 5 min (where  $P = 0.425$  and  $0.565$ ) respectively. Also, there was no statistically significant difference in mean hemoglobin or random blood sugar of newborn of both groups (where  $P = 0.622$  and  $0.211$ ) respectively. The comparison between the two studied groups regarding  $O_2$  saturation shows that there was statistical significance difference in mean value where ( $P = 0.025$ ), but no significant difference between both groups as regards serum bilirubin level where ( $P = 0.123$ ) (Tables 1 and 2).

## Discussion

With few exceptions, the umbilical cord of every newborn is clamped and cut at birth, yet the optimal timing for this intervention remains controversial.

Trial evaluating a variety of definitions of early clamping and cutting ranging from immediately after delivery of the baby up to 30 seconds after birth.

The same confusion also exists as regards late or delayed cord clamping which applied when the mean delay 2–3 min after birth or when cord pulsation has ceased.<sup>7</sup>

Placental transfusion is defined as the amount of blood that flows from the placenta to the infant at birth. A 2011 study weighing babies with cord intact showed that the maximal mean volume of placental transfusion is between 24 and 312 ml/kg of body weight or an additional 30–40% of blood volume, moreover, net placental flow appears to stop at two minutes. The quantity of blood transferred to the infant is thought to be influenced by several factors: the timing of umbilical cord clamping, gravity, the administration of uterotonic (such as oxytocin), and the milking of the cord.<sup>8</sup>

In 2007, the World Health Organization recommended that “the cord should not be clamped earlier than necessary.”<sup>2</sup> Also, in 2008, a Cochrane review showing the effect of the timing of clamping the umbilical cord on maternal and neonatal outcomes in term infants was published<sup>9</sup>.

In response to this review, the American Congress of Obstetricians and Gynecologists deemed that “The evidence does not seem sufficient strong for a change in policy”, but it does encourage a relaxed approach to the timing of cord clamping.<sup>2</sup>

In 2009, The Society of Obstetricians and Gynecologists of Canada published a clinical practice guide line on the management of the third stage of labour, Which stated that for term newborn, the possible increase of neonatal jaundice

**Table 2** comparison between the two studied groups regarding main results.

	Group 1	Group 2	P
<i>At 1 min</i>			
Range	7–10	7–10	0.425
Mean	8.01	8.11	
S.D.	0.77	0.69	
<i>At 5 min</i>			
Range	8.10	9.10	0.565
Mean	9.2	9.68	
S.D.	0.75	0.31	
<i>Hb level</i>			
Range	12.5–16.0	12.8–16.8	0.622
Mean	14.82	14.99	
S.D.	1.98	1.87	
<i>Random blood sugar</i>			
Range	66–122	70–128	0.211
Mean	92.5	96.9	
S.D.	21.6	10.9	
<i>O<sub>2</sub> saturation on the third day</i>			
Range %	83–89	89–92	0.025*
Mean	85.5	90.3	
S.D.	1.3	1.11	
<i>Bilirubin level on the 3rd day (mg/dl)</i>			
Range	4.8–10	5–11	0.123
Mean	6.95	7.01	
S.D.	2.01	2.31	

\* Significant difference and the level of significant was 0.05.

requiring phototherapy must be weighed against the physiological benefits of greater hemoglobin and iron levels up to 6 months of age conferred by delayed cord clamping.<sup>9</sup>

In this study, neonatal Apgar score, hemoglobin, random blood sugar did not significantly differ (in spite of to be improved in DCC) between both groups possibly because the time interval between cord clamping and Apgar score and other variables was too brief to permit expression beneficial or adverse effects.

Also this study showed significant changes (i.e. improvement) in blood gases, e.g.  $O_2$  saturation when the umbilical cord clamping at birth was delayed.

Despite arise in the oxygen saturation when the newborn started to breathe, a trend towards a mixed respiratory and metabolic acidemia developed as characterized by decreases in PH,  $\uparrow PO_2$  and slight  $\downarrow PCO_2$ . Subsequently, bicarbonate, the main buffer in the fetus and newborn, decreased over the whole period

A prospective observational study of vaginally delivered term newborn infants suggests a trend towards a mixed respiratory and metabolic acidosis when umbilical cord clamping is delayed, the authors of this study found a slight fall in arterial blood PH (by 0.03 units) and increase  $O_2$  saturation in DCC group. Although the statically significant of this finding is uncertain, a more recent RCT analyzing the acid–base status of both arterial venous cord blood showed no difference between ECC and DCC groups,<sup>10</sup> this agreed with this study but the small sample size may the cause of significant difference in  $O_2$  saturation.

**Table 1** Comparison as regards baseline data.

Baseline data	Group I	Group II	P
<i>Maternal age</i>			
Range	20–35	25–34	0.423
<i>Gestational age at birth</i>			
Range	37–40 w	38–41	0.576
<i>Neonatal weight</i>			
Range	3000–4500 g	3300–4000 g	0.912

Regarding the bilirubin level jaundice is after attributed to delayed cord clamping with little evidence of causality. However, most studies did not show significant difference in bilirubin levels between early and late cord clamping in full term normal weight infants.<sup>12–14</sup>

This study agreed with these findings, no significant difference was found between DCC and ECC in total serum bilirubin levels at 72 h, but the mean bilirubin concentrations were higher in DCC group, but did not reach the levels requiring phototherapy or exchange transfusion.

In agreement with Cochrane review 2008, and recommendations of the Society of Obstetricians Gynecologists, our study proved that delayed cord clamping until the pulsations stop is a physiological way of treating the cord and is not associated with adverse effects, at least in term vaginal delivers. Even the overall available evidence that appears to suggest delayed cord clamping is likely to result in better neonatal outcomes in term infants.<sup>11</sup> Even in areas where neonatal iron deficiency anemia is rare.<sup>12</sup> So delayed cord clamping is a safe simple procedure should be incorporated in a labor management.

## Ethical disclosures

### Protection of human and animal subjects

The authors declare that no experiments were performed on humans or animals for this study.

### Confidentiality of data

The authors declare that they have followed the protocols of their work center on the publication of patient data.

### Right to privacy and informed consent

The authors declare that no patient data appear in this article.

### Conflicts of interest

The authors have no conflicts of interest to declare.

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