

Review Article

Timing of Umbilical Cord Clamping and Midwifery Practices

Guner S and Genc RE*

Department of Midwifery, Ege University, Turkey

***Corresponding author:** Rabia Ekti Genc, Ege University Faculty of Health Sciences, Ege University Campus, Izmir, Turkey**Received:** July 01, 2016; **Accepted:** August 26, 2016;**Published:** August 29, 2016**Abstract**

The primary reason of maternal mortality in the world is hemorrhage and it is most frequently occurs in the third stage of labor. Practices in this stage generally gather in two groups, namely "active management" and "expectant management". In the management of the third stage of the labor, timing of umbilical cord clamping varies. Early cord clamping is preferred more, with the need to prevent postpartum hemorrhage, resuscitation need of neonate, need to prevent cases polycythemia, neonatal jaundice. However, delay of postpartum cord clamping provides blood volume, hemoglobin, hematocrit and iron supply from placenta to neonate. Also, there are strong evidence that it decreases the risk of intraventricular hemorrhage and necrotizing enterocolitis in preterm babies. Aim of the article is to discuss the relation of the maternal and neonatal impacts of the timing of umbilical cord clamping with midwifery practice.

Keywords: Management of the third stage of labor; Early clamping; Delayed cord clamping; Midwifery

Introduction

The third stage of labor covers the time from the delivery of baby to the delivery of placenta. In the literature, two approaches named "active management" and "expectant management" are underlined for management of this stage [1]. Active management includes prophylactic uterotonic medication, early umbilical cord clamping, controlled cord traction for placenta delivery [2] and fundus massage after cord delivery [3]. Expectant management, on the other hand, includes the contraction of uterus and spontaneous separation of placenta with methods including natural Oxytocin secretion, without using prophylactic uterotonic. In addition, controlled cord traction and cord clamping are not applied in this approach [4].

"Umbilical cord clamping", an application done in the third stage, is defined as clamping of the umbilical cord after the delivery of fetus, by placing two clamps in 4-5 cm distance to fetal abdomen [5]. As long as the umbilical cord is not clamped, stream between placenta and neonate continues [6].

Timing of umbilical cord clamping

In 1950s, American College of Obstetricians and Gynecologists (ACOG) [7] has defined the concept of "early clamping" as clamping of the umbilical cord within one minute after labor and "delayed cord clamping" as clamping after 5 minutes or later. Today, on the other hand, "early clamping" is defined as the clamping of umbilicus within the first 60 seconds after labor (generally within 15-30 seconds), whereas "delayed cord clamping" is defined as clamping later than 1 minute following the labor or clamping after the disappearance of pulse in cord [8].

The best timing for umbilical cord clamping is a scientifically discussed matter for a long time. According to Rincon et al. [9], until recently, umbilical cord had been clamped within a few seconds after labor and this application was based on the idea of protection of neonate from complication such as polycythemia,

hyperbilirubinemia, hyper viscosity. Today, early clamping is also done commonly with the aim not to have a delay in resuscitation and to prevent hypothermia [10].

According to World Health Organization (WHO) [11], although timing of umbilical cord clamping time varies according to clinic policies and practices, studies carried in several countries about this subject show that in practice, early cord clamping is done much more frequently. Regardless of the fact that there are several randomized controlled studies about the benefits of delayed of umbilical cord clamping for term and preterm neonates, the ideal timing is not yet determined and debates about this issue continue [7].

Effects of timing of umbilical cord clamping on neonate

In preterm pregnancy, two thirds of fetoplacental blood volume belongs to fetus, whereas in preterm pregnancy, half of it belongs to fetus. Pulmonary blood stream increases just after labor and the amount of blood going to pulmonary vascular bed constitutes about half of the cardiac output. This process is slower in preterm babies than it is in term babies. Blood volume during hemodynamic changes taking place after labor is very important and all neonates are under risk of hypovolemia within one day after labor, whereas risk for preterm babies is greater [10,12,13].

Waiting for 2-3 minutes or until the stop of pulse in cord for clamping the umbilical cord allows for the physiological transition of the placental blood to neonate (the process is named as placental transition) and the large part of transition occurs within these few minutes [11]. It is stated that, in term pregnancy, delayed of umbilical cord clamping for 30-60 seconds provides 11% increase in total blood volume and 23% increase in erythrocyte volume and in preterm neonates, on the other hand, a delay of 30-45 seconds provides 8-30% increase in total blood volume [10,14,15]. This transferred blood can supply an iron supply of 40-50 mg/kg with regard to the bodyweight. This extra iron, when it combines with the iron in the body of neonate

(almost 75 mg/kg), can contribute to prevention of iron deficiency in the first year of life [16,17]. When the need of iron for myelination in brain, where functional development continues in the first year of life, is considered [18], the blood volume to be transferred to neonate by means of late clamping becomes more important.

In studies about delayed of cord clamping, the most consistent results are found as the increase in hemoglobin and hematocrit levels and the related decrease in the need for blood transfusion [9,19]. In Cochrane collection by McDonald et al. [20], the hemoglobin levels measured at 24th and 48th hours of life are found significantly high in the group of babies subjected to delayed cord clamping than group of babies subjected to early clamping. Similar to the ones in early period after labor, it is revealed in the longer term monitoring of neonates that hemoglobin, iron and ferritin levels were high and as a result of this, risk of iron deficiency anemia decreased for these babies [17,21].

Main concerns about delayed of cord clamping are polycythemia due to placental diffusion, increase in blood viscosity and possibility of neonatal jaundice [12,22]. When meta-analysis of studies about polycythemia with term and preterm babies are analyzed, no difference of symptomatic polycythemia has been found between groups with late and early timing of cord clamping [12].

When studies about neonatal jaundice are analyzed, different results can be seen. McDonald et al. [20], reached to the result that the need for phototherapy due to jaundice was less for neonates in the group where early clamping was done than neonates in the group where delayed cord clamping was done and stated that it can be beneficial where phototherapy is available. In other studies, on the other hand, it was revealed that there is not any significant difference between groups of early and delayed cord clamping in terms of bilirubin levels at 48th hour after labor [9] and being subject to exchange transfusion due to jaundice [2,23].

Two other subjects on which timing of cord clamping have impact are admission of neonate to neonatal intensive care unit and mortality of neonate. According to recent and large scale studies [2,9,20], no significant difference between neonates in groups of early and delayed cord clamping in terms of special care or admission to neonatal intensive care units is found. Additionally, in a study [24] it is found that after the start of spontaneous respiration, each 10 seconds of delay in cord clamping will result in 20% decrease in admission of neonate to neonatal intensive care units and in mortality and it is advised that the cord should not be clamped before the start of spontaneous respiration by neonate.

Advice of WHO about this subject is [11] not to clamp umbilical cord before 1 minute if neonate is not asphyxiating or there is not any need of urgent resuscitation (strong advice). WHO, at the same time, advises that, if spontaneous respiration of neonate did not start before cord clamping, drying should be done and some tactile stimulants should be given and after that positive-pressure ventilation should be started and for the efficiency of positive-pressure ventilation, clamping should be done (conditional advice).

Impacts of timing of umbilical cord clamping are more important for especially preterm babies. Delayed of umbilical cord clamping provides increase in blood and erythrocyte volumes in preterm babies and this leads to improvement in tissue-organ perfusion [10]. As a

result of 15 studies analyzed by Rabe et al. [23], it is stated that this blood provided for preterm baby through delayed cord clamping (delayed for 30-180 seconds) decreases the need for blood transfusion, ensured a better stabilization in blood stream and decreased the risk of intraventricular hemorrhage [25] and necrotizing enterocolitis.

In general, the benefits that can be obtained by delaying the timing of umbilical cord clamping in term and preterm neonates can be listed as increase in blood volume, hemoglobin and iron, decrease in risk of anemia within the first year after labor, decrease in need of blood transfusion and decrease in mortality and in the need of admission to neonatal intensive care units. In preterm neonates, decrease in risks for intraventricular hemorrhage and necrotizing enterocolitis, in addition to these benefits, are important subjects which must be considered with great attention.

Maternal effects of timing of cord clamping

In active management of third stage of labor, “early clamping of umbilical cord” is applied, whereas in expectant management, “delayed cord clamping” is applied. As, maternal effects of clamping of umbilical cord are generally analyzed within the scope of studies about management of third stage, “active management and expectant management” will be mentioned.

Worldwide, reason for 25% of all maternal mortality cases is postpartum hemorrhage. Primary reason for postpartum hemorrhage is uterine atony [3]. In term, a blood stream of almost 600 ml/min exists from spiral artery and veins to uterus and concerns about management of the third stage concentrate around postpartum hemorrhage [7]. However, there is not a consensus in existing literature about effects of timing of umbilical cord clamping on maternal results.

In a Cochrane collection published in 2015 [2], 7 studies carried in high-income countries were analyzed and it was revealed that the group in which the third stage of labor was managed actively had a significantly lower risk of postpartum hemorrhage. The conclusion was reached that this analysis must also be carried in low-income countries. In another collection where McDonald et al. [20] analyzed 20 randomized controlled studies comparing timings of umbilical cord clamping, it is stated that there was not any significant difference between two groups in terms of maternal postpartum hemorrhage. In the same collection, in subgroups including 3 studies, no significant difference was detected between uterotonic medication and maternal hemoglobin levels at 24th and 72nd hours after labor [22]. In contrast with literature, in a randomized controlled study carried within a low-risk group with regards to postpartum hemorrhage, active management of third stage of labor was found related to 7-8 fold increased risk of postpartum hemorrhage in this group [26]. In another study, the result was reached that active management of third stage of labor did not decrease blood loss in this process, but it shortened the period of blood loss [27].

Timing of umbilical cord clamping and midwifery practices

It is obvious that the factor which affects the attitude of midwives and determined the timing of cord clamping in the third stage of labor is their perspective about labor. Views of midwives who participated in a study carried in Sweden about this subject were in the direction that labor was a normal process and the third stage can also be

managed by their midwifery abilities. It was determined that majority of participants to focus group interviews were against applying any unnecessary medication or practices unless a risk emerged during labor [28].

In another study in Sweden and New Zealand with participation of midwives [4], it was found that participants used expectant management in almost one third of labors. Participants stated that in third stage of labor they realized applications such as body contact, breast-feeding and non-clamping of umbilical cord. As conclusion, it is revealed that a vast majority of midwives described the third stage of labor as “a special period when parents and baby recognize each other” and they do not perform unnecessary interventions in this stage, they adopt an approach they name as “careful/shrewd waiting”.

In a study carried in US [12], it is determined that 35% of midwives and midwife-nurses wait for clamping until pulse in cord stops in third stage of labor, but also it is found that 26% of them clamp the umbilical cord before one minute. In the same study, midwives justified delayed of clamping with blood volume, ensuring food and oxygen transition at optimal levels and they justified early clamping with prevention of damage to neonate by polycythemia. In a study in Saudi Arabia carried with the aim to determine labor practices, it is found that mainly obstetricians took part in labors and early cord clamping was one of the applications performed during the third stage of labor in 8 hospital out of 9 [29].

As seen in literature, it is obvious that, in third stage applications including timing of cord clamping, participation of midwives to decision-making processes and their autonomies are important. Related to this subject, it is seen that in studies carried in countries where occupational autonomies of midwives are better improved, the approach of midwives is mainly for waiting, whereas in other countries active management is adopted. At the same time, another common point of these studies is that, the existing literature should be supported by new studies.

Because of the prevention of maternal mortality policies it is recommended hospital births by Ministry of Health In Turkey. “Active approach” is implemented in the third stage of labor in hospitals. Under the active approach, umbilical cord is clamped as soon as possible after birth. In the process of birth, obstetricians are located at the center of decision-making mechanisms in Turkey and it is difficult to say that midwives are able to use their autonomy. The active role of the midwives in the births process, it is clear that increases the tendency of natural birth.

Conclusion and Suggestions

Although early cord clamping is used commonly, evidences obtained by large-scale randomized controlled studies indicate that neonate can be protected from anemia by delaying the cord clamping [7,30]. Delay of umbilical cord clamping up to 60 seconds will increase total body iron store and it will be beneficial especially in the population with iron deficiency. WHO [11] also advises that the umbilical cord clamping should not be done in a period shorter than 1 minute for supporting nutrition in babies.

With regards to its benefits to term and preterm neonates and indirection with WHO's strong advices [11], it is concluded that delay of cord clamping in third stage of labor up to 60 seconds by medical

professionals, especially in low-income regions and regions with iron deficiency anemia problem should be popularized and supported by new studies. In addition to this, as there is not a consensus about the claim that the attitude of delaying cord clamping results in maternal postpartum hemorrhage in the existing literature, new and large scale studies are needed.

References

1. Maughan KL, Heim SW, Galazka SS. Preventing postpartum hemorrhage: managing the third stage of labor. *American Family Physician*. 2006; 73: 1025-1028.
2. Begley CM, Gyte GML, Devane D, McGuire W, Weeks A. Active versus expectant management for women in the third stage of labour. *Cochrane Database of Systematic Reviews*. 2010; 7: 7412.
3. Low KL, Bailey MJ, Sacks E, Robles C, Medina L. Reduced postpartum hemorrhage after implementation of active management of the third stage of labor in rural Honduras. *International Journal of Gynecology and Obstetrics*. 2012; 119: 217-220.
4. Begley CM, Guilliland K, Dixon L, Reilly M, Keegan C. Irish and New Zealand midwives' expertise in expectant management of the third stage of labour: The 'MEET' study. *Midwifery*. 2012; 28: 733-739.
5. Cunningham GF, Leveno KJ, Bloom SL, Hauth Jc, Rouse DJ, Spong CY. *Williams Obstetrics. Preconceptional Counseling*. New York, Mc Graw Hill Companies. 2010.
6. Gungor I, Yildirim-Rathfisch G. Evidence Based Practices in the Second and Third Stage of Normal Labor. *Journal of Research and Development in Nursing*. 2009; 11: 56-65.
7. Committee Opinion No 543: Timing of umbilical cord clamping after birth. *The American College of Obstetricians and Gynecologists*. 2012; 126: 1522-1526.
8. Pan American Health Organization and World Health Organization regional office for the Americas. *beyond survival: Integrated delivery care practices for long-term maternal and infant nutrition, health and development*, 2nd Edn. Washington, DC: Pan American Health Organization; 2013.
9. Rincon D, Foguet A, Rojas M, Segarra E, Sacristan E, Teixidor R, et al. Time of cord clamping and neonatal complications, a prospective study. *An Pediatr (Barc)*. 2014; 81: 142-148.
10. Gokmen Z. Effects of delayed umbilical cord clamping on peripheral hematological parameters and peripheral blood haematopoietic stem cells in premature neonates. Baskent University, Faculty of Medicine, Department of Pediatrics, Division of Neonatology, Thesis, Ankara. 2011.
11. WHO. *Guideline: Delayed umbilical cord clamping for improved maternal and infant health and nutrition outcomes*. Geneva: World Health Organization. 2014.
12. Mercer JS. Current best evidence: a review of the literature on umbilical cord clamping. *Journal of Midwifery & Womens Health*. 2001; 46: 402-414.
13. Rennie MJ. *Rennie & Robertson's Textbook of Neonatology*. 5th Edn. Elsevier Health Sciences. 2012.
14. Yigit MB, Kowalski WJ, Hutchon DJR, Pekkan K. Transition from fetal to neonatal circulation: modeling the effect of umbilical cord clamping. *Journal of Biomechanics*. 2015; 48: 1662-1670.
15. Kluckow M, Hooper SB. Using physiology to guide time to cord clamping. *Seminars in Fetal & Neonatal Medicine*. 2015; 20: 225-231.
16. Pisicane A. Neonatal prevention of iron deficiency. *BMJ*. 1996; 312: 136-137.
17. Chaparro MC. Timing of umbilical cord clamping: effect on iron endowment of the newborn and later iron status. *Nutrition Reviews*. 2011; 69: 30-36.
18. Todorich B, Pasquini JM, Garcia CI, Paez PM, Connor JR. Oligodendrocytes and myelination: the role of iron. *Glia*. 2009; 57: 467-478.
19. Chirico G. The umbilical cord: a source of great richness. *Early Human Developments*. 2013; 89: 47-48.

20. McDonald SJ, Middleton P, Dowswell T, Morris PS. Effect of timing of umbilical cord clamping of term infants on maternal and neonatal outcomes. *Cochrane Database of Systematic Reviews*. 2008; 2: 40747.
21. Chaparro MC, Neufeld LM, Alavez GT, Cedillo REL, Dewey KG. Effect of timing of umbilical cord clamping on iron status in Mexican infants: a randomised controlled trial. *Lancet*. 2006; 367: 1997-2004.
22. Linderkamp O, Nelle M, Kraus M, Zilow EP. The effect of early and late cord-clamping on blood viscosity and other hemorheological parameters in full-term neonates. *Acta Paediatr*. 1992; 81: 745-750.
23. Rabe H, Diaz-Rossello JL, Duley L, Dowswell T. Effect of timing of umbilical cord clamping and other strategies to influence placental transfusion at preterm birth on maternal and infant outcomes. *Cochrane Database of Systematic Reviews*. 2012; 8: 3248.
24. Ersdal HL, Linde J, Mduma E, Auestad B, Perlman J. Neonatal outcome following cord clamping after onset of spontaneous respiration. *Pediatrics*. 2014; 134: 265-272.
25. Mercer JS, Vohr BR, McGrath MM, Padbury JF, Wallach M. Delayed cord clamping in very preterm infants reduces the incidence of intraventricular hemorrhage and late-onset sepsis: a randomized, controlled trial. *Pediatrics*. 2006; 117: 1235-1242.
26. Fahy K, Hastie C, Bisits A, Marsh C, Smith L, Saxton A. Holistic physiological care compared with active management of the third stage of labour for women at low risk of postpartum haemorrhage: a cohort study. *Women and Birth*. 2010; 23: 146-152.
27. Kashanian M, Fekrat M, Masoomi Z, Ansari NS. Comparison of active and expectant management on the duration of the third stage of labour and the amount of blood loss during the third and fourth stages of labour: a randomised controlled trial. *Midwifery*. 2010; 26: 241-245.
28. Jangsten E, Hellstrom AL, Berg M. Management of the third stage of labour-focus group discussions with Swedish midwives. *Midwifery*. 2010; 26: 609-614.
29. Altaweli RF, McCourt C, Baron M. Childbirth care practices in public sector facilities in Jeddah, Saudi Arabia: a descriptive study. *Midwifery*. 2014; 30: 899-909.
30. Mercer JS, Erickson-Owens, Graves B, Mumford Haley M. Evidence-based practices for the fetal to newborn transition. *Journal of Midwifery & Women's Health*. 2007; 52: 262-272.