



Delayed Cord Clamping: Ancient Phenomena but New Perspective

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In 1801, Erasmus Darwin suggested that *'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 than it ought to be'*. That perception changed in 1900's with the invent of modern day medicine and the practice of immediate cord clamping (ICC) cemented its place in normal maternal and newborn care, though it was perceived that early cutting of umbilical cord would offer benefit to the mother and would

pose no "inconvenience" to the newborn. Umbilical cord clamping is not just a symbolic separation of infant from mother, but it can have a significant impact on infant's wellbeing after the birth. There is substantial evidence supporting the natural approach of delayed cord clamping (DCC) at birth. This practice is now endorsed by the major governing bodies affiliated with maternal-newborn care (Table-1).

Each of the governing bodies has their interpretation of the available evidence, which is evident in their recommendations (Table-1). ACOG, SOGC and AAP limit DCC in infants who are premature while RCOG, ILCOR and WHO recommend delayed clamping of the cord in all newborns. Also, recommendations on how long to delay the clamping of the umbilical cord differs; recommendations vary from 30 seconds to 3 minutes. This incongruity in recommendations may lead to confusion amongst the providers, which can create an impedance in the implementation and widespread success of these practices. It makes it imperative to learn the role of DCC in transitional circulation in order to make an educated decision for their patients.

In fetuses, the placenta does the gas exchange, and lungs receive only 10% of the cardiac output. The transition from fetal to newborn life represents one of the most significant physiological challenges that any human will encounter. As lung aeration can only occur after birth and is a pre-requisite for newborn survival, it is an ideal trigger for initiating the physiological changes that underpin the transition to newborn life. That transition is initiated by first breath which leads to a decrease in pulmonary resistance and increasing its pulmonary blood flow. If infant receives immediate cord clamping (ICC), there is a sudden increase in systemic resistance by occlusion of umbilical arteries and drop in effective blood volume (preload) as an effect of blocking umbilical vein, which can cause significant changes in vital parameters like heart rate and blood pressures during this transitional. These associated changes with ICC would become even more apparent in infants who are born premature or asphyxiated; little hemodynamic fluctuation can worsen insults to the vital organs which would impact their short and long-term outcome. In newborns with DCC; uninterrupted supply of oxygenated blood through umbilical vein to the left atrium

Guidelines of delayed cord clamping (DCC)	
WHO:	Delay of umbilical cord clamping for 1–3 minutes after birth is recommended for all births with simultaneous essential newborn care.
ACOG:	Evidence supports delayed umbilical cord clamping in preterm infants. Insufficient evidence exists to support or refute the benefits of delayed umbilical cord clamping for term infants born in resource-rich settings.
AAP:	Endorsed recommendations of ACOG (above) SOGC Delayed cord clamping by at least 60 seconds is recommended. The risk of jaundice is weighed against the physiological benefits of delayed cord clamping.
RCOG:	Delay clamping the umbilical cord earlier than necessary unless exigent circumstances such as heavy maternal blood loss or the need for immediate neonatal resuscitation take priority.
ILCOR:	Delay umbilical cord clamping for at least 1 min for newborn infants not requiring resuscitation. Evidence does not support or refute delayed cord clamping when resuscitation is needed.

Table 1: Guidelines of delayed cord clamping (DCC).

Abbreviations: WHO: World Health Organization; ACOG: American College of Obstetricians and Gynecologists; AAP: American Academy of Pediatrics; SOGC: Society of Obstetricians and Gynecologists of Canada; RCOG: Royal College of Obstetricians and Gynecologists; ILCOR: International Liaison Committee on Resuscitation.

through foramen ovale stabilizes the cardiac output to provide stable oxygen and blood supply to the vital organs during this transition. In the infant with asphyxia, this oxygenated blood can be vital for the time effective ventilations are established. It has also been proven that for preterm infants by minimizing these transient fluctuations in vital parameters, the incidence of necrotizing enterocolitis and intraventricular hemorrhage can be decreased. Also, this oxygenated blood when pushed to lungs can decrease pulmonary pressures and could further help with improving ventilation. With a better understanding of the transitional physiology, this is apparent that performing DCC till the time ventilation is established, which could spontaneous cry in healthy newborn to endotracheal intubation in compromised newborns can benefit all newborns.

In term infants about one-third of blood flows through the placenta and two-thirds flows through the fetus at any point. Amount of blood flowing through the placenta is inversely proportional to the gestational age. In healthy term infants, ICC results in around 30% of fetoplacental blood volume remaining in placenta, whereas DCC reduces the residual volume by 10% with 60 seconds and by 17% with the delay in cord clamping by 3-5 minutes. There are also other factors like uterine contractions, and spontaneous breathing in neonates that can influence the transfer of placental blood to the newborn after the delivery, while the placement of baby after delivery have little influence on the transfusion of placental blood.

With practice of DCC, there is a small increase in the incidence of jaundice that requires phototherapy in term infants undergoing delayed umbilical cord clamping. There is no evidence that it increases the chances of bilirubin encephalopathy.

Recommendation

1. All birth centers should have a well-written policy of DCC.
2. All newborn infants irrespective of gestational age can be benefitted by DCC.
3. In most infant's cord pulsation last around 3 minutes. That can be a benchmark for healthy vigorous infants.
4. There is a need to offer DCC even infants who need active resuscitation. Arrangements can be made to initiate resuscitation at the mother side while the infant is still attached to the placenta.
5. In a sick newborn, infant resuscitation takes precedence, and it should never be delayed.

6. Providers should ensure that mechanisms are in place to monitor and treat neonatal jaundice
7. The success of that policy depends upon the commitment of all the stakeholders involved in obstetrical to newborn care.

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