

# PROGENY

VOL XXXII, NO 2

August 2016

## Delayed Umbilical Cord Clamping

The optimal timing for umbilical cord clamping has been the subject of debate dating back to the mid 1950's with the first series of studies comparing "early clamping," within one minute of birth and "late clamping," more than five minutes after birth. With the lack of clear recommendations on the optimal timing, the interval for clamping the umbilical cord was gradually shortened. In the 1960's the practice of "active management of the third stage of labor" was introduced with the goal of reducing postpartum hemorrhage and preventing placental retention. The initial components included uterotonic medications after birth and steady traction on the umbilical cord to deliver the placenta. The practice of immediate cord clamping may have been as unintended addition to these steps, supported in part by the emergence of pediatric teams in the delivery room to assist with newborn resuscitation.

In contemporary obstetrics, it is routine to clamp the cord immediately, within 15-20 seconds after birth while the infant is held at or below the level of the placenta. However, recent evidence to support the practice of delayed cord clamping for both preterm and term infants has emerged. With the release of the 7<sup>th</sup> Edition Guidelines for the Neonatal Resuscitation Program (NRP)<sup>2</sup>, there are new recommendations regarding the routine timing of umbilical cord clamping for vigorous term and preterm newborns who do not require resuscitation after birth. In this newsletter, we will address the issues surrounding the latest recommendations for delayed umbilical cord clamping.

### Definitions

- Time of birth: the time recorded upon complete expulsion or extraction of the fetus from its mother, regardless of whether or not the umbilical cord has been cut or the placenta is attached
- Early/Immediate cord clamping (ICC): the umbilical cord is clamped immediately or within 30 seconds after birth, regardless of the presence or absence of cord pulsation
- Delayed cord clamping (DCC): waiting to clamp the umbilical cord for at least 30 seconds after birth for preterm infants; waiting for at least 60 seconds for term infants, typically at 1 to 3 minutes after delivery
- Late umbilical cord clamping: waiting to clamp the umbilical cord for at least 1 to 3 minutes after birth *or* until after the cessation of cord pulsation; in most healthy term infants, pulsation of the cord stops within the first 2 minutes after birth

- Placental transfusion: transfer of fetal blood in the placenta to the infant at the time of birth; before the cord is clamped, a transfer from the placenta of approximately 80 mL of blood occurs by 1 minute after birth reaching approximately 100 mL at 3 minutes after birth<sup>4</sup>
- Umbilical cord “milking”: physically or manually expressing blood from the umbilical cord in a direction away from the placenta toward the baby; typically involves a 20 cm segment of cord that is milked 2-4 times

### Summary of Current Recommendations:

#### *World Health Organization (WHO)*

“Delayed umbilical cord clamping (not earlier than 1 minute after birth) is recommended for improved maternal and infant health and nutrition outcomes.”<sup>3</sup>

#### *American Academy of Pediatrics (AAP)/American Heart Association (AHA)*

Current evidence suggests that cord clamping should be delayed for at least 30 to 60 seconds for most vigorous term and preterm infants. There is insufficient evidence to recommend an approach to cord clamping for newborns who require resuscitation at birth.<sup>2</sup>

#### *American College of Obstetricians and Gynecologists (ACOG)*

Evidence exists to support delayed cord clamping in preterm infants, when feasible. They acknowledge that the associated neonatal benefits of DCC include a lower frequency of iron deficiency anemia in term infants. However, they conclude that the evidence is insufficient to confirm or refute the benefits of DCC for term infants born in resource-rich settings.<sup>4</sup>

### Sample Protocol:

#### **Delayed Umbilical Cord Clamping (DCC) Protocol\***

1. Prior to delivery, establish a consensus that cord clamping will be delayed for a specified duration (range 30-60 sec.).
2. Prepare two warm sterile towels for transfer of the infant from the obstetrician to the neonatologist.
3. An assigned timekeeper starts a timer as soon as the infant is delivered from the womb, and thereafter announces the time in 15-second intervals.
4. DCC: Upon delivery, the infant is held in the warm towel by the obstetrician and cord clamping is delayed for the specified interval.
5. When the delay interval has been reached, the obstetrical provider clamps the umbilical cord in standard fashion and calls out “Cord clamped!”
6. During the DCC interval, it is appropriate to call out any possible safety concerns as they may arise.
7. The infant is transferred to the neonatologist’s warm towel and routine newborn resuscitation is performed per current NRP guidelines.
8. The duration of DCC is recorded in the electronic medical record.

\*McAdams RM, Backes CH, Hutchon DJR. Steps for implementing delayed cord clamping in a hospital setting. Maternal Health, Neonatology, and Perinatology. 2015 Apr 13; 1:10. Department of Pediatrics, Division of Neonatology, University of Washington.<sup>5</sup>

## **Benefits of Delayed Cord Clamping Versus Immediate Cord Clamping**

### *Evidence for preterm infants:*

- Smoother transition to extrauterine life, particularly if the baby starts breathing before the umbilical cord is cut<sup>6</sup>
- Significant reduction in the incidence of intraventricular hemorrhage, includes ultrasound diagnosis of all grades (9 trials, 499 infants)<sup>7</sup>
- Higher, more stable neonatal blood pressures (5 trials, 240 infants)<sup>7</sup>
- Improved cardiovascular stability and increased cardiac output (2 trials, 81 infants)<sup>7</sup>
- Decreases the need for vasopressors and blood transfusions during the neonatal period (7 trials, 398 infants)<sup>7</sup>
- Decreased incidence of necrotizing enterocolitis (5 trials, 241 infants) and late-onset sepsis (2 trials, 137 infants).<sup>7,8</sup>
- No difference between cord pH, Apgar scores, and body temperature on admission; Aziz et al reported less hypothermia with infants who received DCC.<sup>7,9</sup>
- For other outcomes including infant death, severe intraventricular hemorrhage and periventricular leukomalacia, no differences identified between groups<sup>7</sup>

### *Evidence for term infants:*

- Increased hematocrit/hemoglobin concentrations in the neonatal period<sup>10</sup>
- Decreased frequency of iron deficiency anemia with higher infant ferritin levels out to 6 months of age (numerous studies referenced by ACOG).<sup>4,11</sup>
- No significant differences between immediate and delayed cord clamping with regards to the following maternal outcomes: postpartum hemorrhage, placental retention, duration of the third stage of labor and use of uterotonic medications (meta-analysis of 1,762 term infants and mothers).<sup>11</sup>

## **Addressing Potential Concerns**

### *Infant position during delayed umbilical cord clamping:*

- Until recently, the procedure for delayed cord clamping involved holding the infant for more than a minute at the level of the vagina; this practice was based on the assumption that gravity affects the volume of placental transfusion.
- Many obstetric providers found this practice to be cumbersome and unsafe.
- In 2014, Vain et al reported that the position of the newborn before cord clamping does not seem to affect the volume of placental transfusion; mothers can safely be allowed to hold baby on their abdomen or chest during delayed cord clamping.<sup>12</sup>

### *Symptomatic polycythemia:*

- Multiple randomized controlled trials (RCT's) involving term and preterm infants showed no evidence of increased polycythemia<sup>10,11,13</sup>
- ACOG acknowledges the risk of excessive placental transfusion with delayed cord clamping when other risk factors for fetal polycythemia exist, such as maternal diabetes, intrauterine growth restriction and high altitude.<sup>4</sup>

### *Jaundice and need for phototherapy treatment:*

- Delayed cord clamping has been associated with increased bilirubin levels in term infants when compared to immediate cord clamping.<sup>11,14</sup>
- Preterm infants have higher peak bilirubin concentrations (mmol/L) with delayed cord clamping when compared to those managed with immediate cord clamping (6 trials, 280 infants).<sup>7</sup>
- Several RCT's have demonstrated a small increase (1.6%) in the need for phototherapy in term infants (not preterm) exposed to delayed cord clamping (7 trials, 2,324 infants).<sup>11</sup>

- Another RCT and one meta-analysis showed no significant difference in the need for phototherapy for full term infants with hyperbilirubinemia after delayed cord clamping compared to infants who experienced immediate cord clamping.<sup>10,15</sup>
- For preterm infants, there is no significant difference in the need for phototherapy treatment when cord clamping is delayed (1 trial, 143 infants).<sup>7</sup>
- AAP concludes that the benefits of delayed cord clamping outweigh the risk of hyperbilirubinemia and the increased need for phototherapy treatment; they also acknowledge that more research is needed for populations at high-risk for hyperbilirubinemia.<sup>7</sup>

*Delayed cord clamping may jeopardize timely resuscitation efforts:*

- Maternal emergency is a valid reason to forego DCC and clamp the cord immediately.<sup>4</sup>
- ACOG suggests that “because the placenta continues to perform gas exchange after delivery, sick and preterm infants are likely to benefit most from additional blood volume derived from a delay in umbilical cord clamping.”<sup>4</sup>
- Dr. Tonse Raju, NICHD liaison to the AAP Section on Perinatal Pediatrics Executive Committee and the AAP Committee on Fetus and Newborn published a recent review article on the timing of umbilical cord clamping where he makes the following statement: “In situations where there are no maternal issues, infants with fetal distress (such as those because of nuchal cord) may benefit from improved placental transfusion, as they are likely to be anemic, and hypovolemic, and in shock.”<sup>13</sup>
- Regarding the preterm infant with apnea, Dr. Raju suggests that: “Placental transfusion is the first step in resuscitation of preterm infants at risk for respiratory distress syndrome.”<sup>13</sup>

*Delayed cord clamping might interfere with attempts to collect cord blood for banking:*

- ACOG clearly states that the routine practice of umbilical cord clamping should not be altered for the collection of cord blood for banking.<sup>4</sup>

### **Contraindications**

Delayed cord clamping is contraindicated in situations where placental circulation is not intact, such as placental abruption, bleeding placenta previa, bleeding vasa previa or umbilical cord avulsion.<sup>2</sup> Other potential contraindications include umbilical cord prolapse, antepartum hemorrhage and fetal compromise in a multiple gestation pregnancy.<sup>5</sup>

### **What About Umbilical Cord “Milking”?**

Some controversy exists regarding the practice of umbilical cord milking (UCM), and there are only a few published studies that address this practice. Proponents maintain that it is a safe way to quickly achieve placental transfusion after birth. Several studies compare umbilical cord milking with immediate cord clamping and report some benefit for the newborn. We found only one study that compared UCM (4 times) to delayed cord clamping (30 seconds). Rabe et al randomized 58 preterm neonates <33weeks’ gestation to receive UCM or DCC.<sup>16</sup> The authors found no significant difference in hematocrit and hemoglobin values at one hour of age or in the median number of blood transfusions received within the first 42 days of life. They concluded that milking the cord 4 times achieved a similar amount of placento-fetal blood transfusion compared with delaying clamping of the cord. With regards to umbilical cord milking, both ACOG and AAP advise against umbilical cord milking for preterm infants on the grounds that there is insufficient evidence to support the practice.<sup>2,4</sup> They make no specific recommendations regarding term infants. More research is needed to identify and evaluate the potential risks and benefits.

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