Increasing the Placental Transfusion at Birth: What Difference Does It Make?

Edward F. Bell
Clinical Advances in Pediatrics
Kansas City
19 November 2010

Learning Objectives

1. Summarize the evidence for and against delayed clamping of the umbilical cord at the birth of term infants
2. Summarize the evidence for and against delayed cord clamping for preterm infants
3. Describe how this information should be translated into practice
4. Describe an alternative method of increasing the placental transfusion at birth

Disclosure

- I have no actual or potential conflict of interest in relation to this program

THE EFFECT OF DEPRIVING THE INFANT OF ITS PLACENTAL BLOOD ON THE BLOOD PICTURE DURING THE FIRST WEEK OF LIFE

Q. B. DeMARSH, M.S., B.M., H. L. ALT, Ph.D., M.D.
AND W. F. WINDLE, Ph.D., WITH THE COOPERATION OF DAVID S. HILLIS, M.D.
CHICAGO

JAMA 1941; 116:2568-73

CLAMPING OF THE UMBILICAL CORD*
Its Effect on the Placental Transfusion

ANTHONY E. COLOZZI, M.D.†
ARLINGTON, MASSACHUSETTS

Waiting to Clamp the Umbilical Cord May Be Better for Babies

Cord blood and stem cells continue to flow to newborn in minutes after birth, review finds

_Bloomberg Business Week, May 26, 2010_

---

**Early vs Delayed Cord Clamping for Term Infants**

- Systematic review and meta-analysis
- 15 controlled trials, 1912 infants
- Delayed > 2 minutes
- Delayed clamping associated with
  - Higher hematocrit (including more polycythemia, apparently benign) through 6 months
  - Higher iron stores (ferritin levels)
  - Less anemia

_Hutton EK & Hassan ES. JAMA 2007;297:1241-52_

---

**Early vs Delayed Cord Clamping for Term Infants**

- Cochrane review
- 11 controlled trials, 2989 infants
- Delayed > 1 minute
- Delayed clamping associated with
  - Higher hemoglobin through 6 months
  - Higher iron stores (ferritin levels)
  - More phototherapy for hyperbilirubinemia

_McDonald SJ & Middleton P. Cochrane Database Syst Rev 2008_

---

**Preterm Infants**

---

**Background: Benefits of Delayed Cord Clamping for Preterm Infants**

- Provides an extra endowment of progenitor cells:
  - Increased RBC production
  - Increased WBCs may boost host immune defenses
Systematic Reviews of Delayed Cord Clamping for Preterm Infants

- Rabe H, Reynolds G, Diaz-Rossello J.
  - 7 trials, 297 infants
- Rabe H, Reynolds G, Diaz-Rossello J.
  - 10 trials, 454 infants

Background: Benefits of Delayed Cord Clamping for Preterm Infants

- Increased blood volume
- Improved circulatory and respiratory function
- Reduced need for transfusion
- Improved cerebral oxygenation
- Reduced IVH, NEC, and late-onset sepsis
- One study found better neurodevelopmental outcome, but only followed to 7 months
- Only risk is increased hyperbilirubinemia

### Delayed Cord Clamping for Preterm Infants: Cochrane Review

#### Hematocrit at 4 hours

Rabe et al. *Cochrane Database Syst Rev* 2004

#### Transfused for Anemia

#### Transfused for Low Blood Pressure
Delayed Cord Clamping for Preterm Infants: Cochrane Review

Peak Bilirubin Level

However, . . .

- Despite ample evidence of efficacy, delayed cord clamping has not been widely incorporated into practice
- Possible reasons include concern about delaying newborn resuscitation of infants who need it – the ones who also stand to benefit the most from a larger placental transfusion

An Alternate Strategy for Increasing Placental Transfusion

Umbilical Cord Milking

- An alternate method of increasing volume transferred from placenta to infant at birth
- Hosono et al.
  - Arch Dis Child Fetal Neonatal Ed. 2008; 93:F14
  - Arch Dis Child Fetal Neonatal Ed. 2009; 94:F328
- RCT: 40 infants <29 weeks gestation
  - Cord milking vs early clamping
  - Infants in milking group had higher initial hemoglobin, higher BP, and reduced need for transfusion

Umbilical Cord Milking Techniques

- Hosono 1 (published)
  - Cord milked 2 or 3 times toward infant before clamping
- Hosono 2 (personal communication)
  - Cord clamped and cut as close to placenta as possible, then milked once toward infant
- Rabe (abstract PAS 2010 and paper in press)
  - Cord milked 4 times toward infant before clamping
  - Estimated volume of blood transferred by milking 15 ml/kg

Rabe et al Cord Milking Trial

- Randomized clinical trial of milking the cord four times vs 30-second delay in clamping
- 58 infants <33 weeks gestation
- Similar initial and subsequent hemoglobin levels
- No difference in need for transfusion
- Methods provide equivalent volumes of placental transfusion

Rabe et al. PAS Abstracts 2010; Obstet Gynecol, in press
Umbilical Cord Milking vs Delayed Cord Clamping

- Unpublished estimates suggest similar volume can be provided
- Milking (Hosono’s second technique) occurs after infant handed off from obstetrician to neonatology team
- Takes less time: 10-15 sec vs 60-120 sec
- Reduces concerns about delaying resuscitation

Benefits shown for both techniques:
- Increased initial hemoglobin
- Higher blood pressure
- Reduced need for transfusion

Benefits of delayed clamping not yet shown with milking:
- Increased blood volume
- Improved respiratory function
- Improved cerebral oxygenation
- Reduced IVH, NEC, late-onset sepsis

Conclusions – Term Infants

- In term infants, delaying cord clamping for 60 to 120 seconds results in:
  - Increased blood volume
  - Larger iron stores
  - Less anemia
  - No risk except more frequent hyperbilirubinemia and benign polycythemia
- This practice should be routine

Conclusions – Preterm Infants

- In preterm infants, delaying cord clamping for 60 to 120 seconds results in:
  - Increased blood volume
  - Improved circulatory and respiratory function
  - Reduced need for transfusion
  - Improved cerebral oxygenation
  - Reduced IVH, NEC, and late-onset sepsis
  - Only risk is increased hyperbilirubinemia
- This practice should be routine (However,...)

Conclusions – Preterm Infants

- What about the infant whose resuscitation must be started before 60 seconds?
  - The placenta may continue to provide adequate gas exchange until the cord is clamped
  - Some advise proceeding with the resuscitation while the infant is attached to the placenta
  - Cord milking may provide a good alternative – quicker (allowing resuscitation to be started sooner) and equally effective as delayed clamping; but, more research is needed, including long-term neurodevelopmental outcome