Delayed Cord Clamping

Neonatal Transitional Physiology: A New Paradigm. Mercer JS and Skovgaard RL. *J Perinat Neonat Nurs* (March 2002); 15:56-75.

Early clamping of the umbilical cord at birth, a practice developed without adequate evidence, causes neonatal blood volume to vary 25% to 40%. Such a massive change (in blood volume) occurs at no other time in one's life without serious consequences, even death. Early cord clamping may impede a successful transition and contribute to hypovolemic and hypoxic damage in vulnerable newborns. The authors present a model for neonatal transition based on and driven by adequate blood volume rather than by respiratory effort to demonstrate how neonatal transition most likely occurs at a normal physiologic birth.

Comment. This article is a review of recent literature concerning the optimal timing for umbilical cord clamping after newborn deliveries. The authors site studies showing many benefits from delayed cord clamping, including improving neonatal cardiopulmonary adaptation, blood pressures, oxygen transport, red blood cell flow, days on oxygen and ventilation, and anemia. Immediate cord clamping after delivery has been standard practice for as long as most of us can remember. However, the practice was not based on good scientific evidence, and in some cases, it is clearly harmful. Consider the infant who is born with a tight nuchal cord. In this circumstance, the compression of the umbilical vein frequently causes the baby to pool blood in the placenta rendering the infant hypovolemic. If the umbilical cord is clamped immediately, the hypovolemia perpetuates and the infant presents with pallor, poor perfusion and hypotension. On the other hand, if the nuchal cord can be reduced and the clamping of the cord is delayed, then a placento-fetal transfusion takes place through the umbilical vein which resolves the infant's hypovolemia before shock develops. The authors contend that this same physiology (perhaps to a lesser extent) is present in most deliveries, and that placento-fetal transfusion post delivery is both physiological and beneficial. They also suggest that our current practice of immediate cord clamping after delivery is unnatural, and may, in some cases, be harmful. Except in cases where placental blood flow is already compromised (such as following a placental abruption), I am inclined to agree with them. Another study evaluating the benefits of delayed cord clamping in premature infant deliveries was reviewed in NeoNotes, Vol. 1, Issue 5, 2000 (1-024). That study concluded that premature infants whose cord clamping was delayed for 20-30 seconds required fewer blood transfusions, had higher mean blood pressures, and required fewer volume boluses. No adverse effects of delayed cord clamping were noted. We need to re-evaluate what constitutes optimal timing for umbilical cord clamping.

"Pediatrics", the Official Journal of the American Academy of Pediatrics, has published an article **recommending delayed cord clamping.**

Let's see if we can't make sure all those OBs at our local hospital know about these new recommendations. (Realistically, some of them are going to wait for ACOG to give the official imprimatur, but we can help the process along by sharing this with clients, nurses, etc.)

"CONCLUSIONS.: Delayed cord clamping at birth increases neonatal mean venous hematocrit within a physiologic range. Neither significant differences nor harmful effects were observed among groups. Furthermore, this intervention seems to reduce the rate of neonatal anemia. This practice has been shown to be safe and should be implemented to increase neonatal iron storage at birth." [Ed.: It's odd that they call "delayed cord clamping" an intervention, since it's essentially delaying the actual intervention, which is clamping the cord. But I guess that from

their point of view, it's "natural" for them to rush to clamp the cord, so they have to intervene in their own rush to intervene.]

The effect of timing of cord clamping on neonatal venous hematocrit values and clinical outcome at term: a randomized, controlled trial. [Full text]
Ceriani Cernadas JM, Carroli G, Pellegrini L, Otano L, Ferreira M, Ricci C, Casas O, Giordano D, Lardizabal J.
Pediatrics. 2006 Apr;117(4):e779-86.

The following information is from Volume 3, Issue 3 of Research Summaries for Normal Birth, July 2006, from the Lamaze Institute for Normal Birth:

Summary: In this prospective, multi-center trial researchers examined the effect of delayed cord clamping on iron-deficiency anemia and clinical outcomes in term newborns. Two hundred seventy-six healthy women with uncomplicated pregnancies were randomized to three groups: cord clamping immediately after birth, at 1 minute and at 3 minutes. Venous hematocrit (to measure anemia) and bilirubin (to measure pathologic jaundice) were drawn at 6 hours and 24-48 hours after birth. Newborn physical exams were performed by clinicians who did not know to which group the infant was assigned.

Anemia at 6 hours of age was significantly more common in newborns who were randomized to the immediate cord clamping group. There was also a significant difference at 24-48 hours of age (16.8% of newborns in the immediate clamping group versus 2.2% at 1 minute and 3.3% at 3 minutes). Significantly more infants in the 3-minute group had elevated hematocrit levels (polycythemia) at 6 hours of age. However, none of the polycythemic babies exhibited symptoms or required treatment, and this difference did not persist to 24-48 hours of age. There were no significant differences in bilirubin values, rates of neonatal adverse events, or the infants' weight gain and rate of exclusive breastfeeding in the first month of life. There were no significant differences in maternal outcomes such as blood loss or maternal hematocrit levels.

Significance for Normal Birth: Immediate cord clamping is a practice that has been performed routinely for decades without evidence of benefit. Placental transfer of oxygenated blood, nutrients and stem cells continues for several minutes after birth. Physiologic principles suggest that the optimal transition to life outside the womb depends on this transfer. The study authors note that higher newborn iron levels at birth correlate with less likelihood of childhood anemia, a condition with long-term neurologic consequences. Some pediatricians recommend iron supplementation for breastfed infants, but it may be that by providing the full complement of iron, delayed cord clamping is the only iron supplement healthy babies need. As an added bonus, delayed cord clamping keeps babies in their mother's arms, the ideal place to regulate their temperature and initiate bonding and breastfeeding. This may be an important first step in promoting non-separation of mother and baby after birth.

From Ronnie Falcao-CPM http://www.gentlebirth.org/archives/lateClamping.html

Here's some of the thoughts and ideas I have gleaned over the year s about leaving the umbilical cord to pulse until it stops.

1. Leaving the cord to pulse does "no harm" and therefore should be encouraged. If you can think about what Nature intended, our ancestors way back before scissors and clamps were invented must have had to wait to deal with the cord/placenta until the placenta was birthed. They probably chewed it, ground it with rocks, or burned it through with hot sticks from the fire. The little teeth on the clamps indicate the traumatizing of the vessels is necessary to quell bleeding. [Editor's Note - Some midwives say that if you delay cutting the cord until an hour or so after the birth, there will be no bleeding at all from the stump.]
2. Leaving the cord to pulse slows down the "fire drill" energy that many birth attendants get into after the baby is born. Leaving off the busyness of midwifery for a half hour allows the mother and baby undisturbed bonding time without a "project " going on i.e. the cord cutting instructions, explanations, jokes, etc. The father, too , is undisturbed and able to enjoy this "high" time without focusing on a job at hand.
3. Educator Joseph Chilton Pierce in his book "Magical Child" makes ref to studies that were done on primates who gave birth in captivity and had early cord clamping. Autopsies of the primates showed that early cord clamping produced unusual lesions in the brains of the animals. These same lesions were also found in the brains of human infants when autopsied.
4. In Rh neg women, many people believe that it is the clamping of a pulsing cord that causes the blood of the baby to transfuse into the blood stream of the mother causing sensitization problems. Robert S Mendelsohn, M.D., in his book "How to Have a Healthy Child. . . In Spite of Your Doctor" blames the whole Rh neg problem on too quick clamping of the cord. Especially in Rh neg mothers I urge midwives to wait until the placenta is out before thinking about cord clamping.
5. I think it is interesting that scientists are now discovering that umbilical cord blood is full of valuable T-cells which have cancer fighting properties. A whole industry has sprung up to have this precious blood extracted from the placenta, put in a cooler with dry ice, and taken to a special storage facility to be ready in case the child gets cancer at some time in the future. This is human insanity of the first order. That blood is designed by Nature to go into that child's body at birth, not 30 yrs later! We need to acknowledge that there are things about the newborn circulation and blood composition that we just don't know and we need to bet that Mother Nature had things figured out pretty well for us to survive this long. Maybe the supposed need for Vitamin K in the newborn comes out of early cord clamping?

'Delay cord cutting aids babies'
Waiting up to two minutes to cut the umbilical cord after a premature baby is born could reduce the risk of bleeding on the brain, say researchers.

A team from Brighton and Sussex University Hospitals reviewed seven studies of 297 babies.

Around half of units in the UK do wait, but others cut the cord as quickly as 10 or 15 seconds after birth.

The review is published by healthcare information group, the Cochrane Collaboration.

A slight delay in cord clamping of preterm infants is good for their subsequent health
Dr Heike Rabe, Brighton and Sussex University Hospitals Trust

The seven studies which were reviewed measured blood pressure, red blood cell counts, blood volume, bleeding within the brain and the need for transfusions. Between 60 and 80% of preterm infants less than 32 completed weeks' gestation require transfusion.

But premature babies often have trouble breathing, so doctors aim to move them to special care baby units where they are helped to breathe, which requires the umbilical cord to be clamped and cut quickly.

'A healthier start'

Medical staff ordinarily clamp the umbilical cord in two places after the baby is delivered, then cut the cord between the two clamps. There are no formal guidelines for when the cord should be cut. The latest evidence showed 47% of units performed delayed cord clamping - anything between 30 seconds and two minutes after birth, The researchers say reducing the chances of bleeding in the newborn's brain also cuts the need for transfusions.

They found the delay also reduces anaemia and increases blood pressure and blood volume, giving premature infants a healthier start in life.

Dr Heike Rabe, the neonatologist who carried out the review told BBC News Online: "A slight delay in cord clamping of preterm infants is good for their subsequent health. "It is cheap, leading to no extra cost. The optimal timing is not known yet and needs to be assessed by further studies. Funding needs to be available to perform this clinical research."

She added: "If the cord is left unclamped for a short time after the birth, some of the baby's blood from the placenta passes to the baby to help the flow of blood to the baby's lungs," Rabe explains. "Delaying cord clamping for just a very short time helped the babies to adjust to their new surroundings better." However, other doctors say it is not possible to set down a rule which would be applied to all babies.

'Thickening the blood'

Dr Tonse Raju, a neonatologist at the US National Institute of Child Health and Development in Bethesda, Maryland, said: "I'm comfortable with the 30-second delay, but there are so many things that can happen with a preterm infant that doctors have to use their judgment in each case.

"Blood pressure in preterm infants is so narrow that even seconds can make an important difference." Dr Raju added: "A little extra blood can help restore blood pressure." Low blood pressure may require transfusions of blood or fluids, which can be tricky to accomplish safely in a preterm baby. Dr Raju said delaying clamping too long can send too many red blood cells into the baby's system. That can make the blood too thick, stressing the heart and respiration, and possibly triggering jaundice or brain damage. Such a delay may also prevent adequate resuscitation or unnecessarily expose the baby to cold. However, Dr Rabe said that

despite concerns for the baby's respiratory status, the trials covered in the review offered little guidance about how breathing is affected by cord clamping time. "At least there was no negative effect on babies' breathing after delaying the clamping of the cord." Professor Richard Lilford, RCOG spokesman, said: "This review appears to provide a very clear-cut conclusion. "There is always concern over anything that's done in perinatal care because of the potential impact on long-term health outcomes. "But on the evidence available, it seems that the first assumption should be that clamping is delayed." Professor Lilford said the review should be used to inform guidelines for doctors working in perinatal medicine.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/1/hi/health/3747098.stm

http://www.medscape.com/viewarticle/530352_print

April 20, 2006 — Delayed cord clamping at birth reduces neonatal anemia, according to the results of a randomized trial reported in the April issue of *Pediatrics*.

"The umbilical cord is usually clamped immediately after birth," write José M. Ceriani Cernadas, MD, from the Hospital Italiano de Buenos Aires in Argentina, and colleagues. "There is no sound evidence to support this approach, which might deprive the newborn of some benefits such as an increase in iron storage.... Iron deficiency early in life may have pronounced central nervous system effects such as cognitive impairment; iron deficiency is also the main cause of anemia, one of the most serious conditions in childhood, especially in developing countries."

In 2 obstetrical units in Argentina, 276 neonates born at term without complications to mothers with uneventful pregnancies were randomized to cord clamping within the first 15 seconds (group 1), at 1 minute (group 2), or at 3 minutes (group 3) after birth.

At 6 hours after birth, mean venous hematocrit values were 53.5% in group 1, 57.0% in group 2, and 59.4% in group 3. Statistical analyses showed equivalent results among groups because the hematocrit increase in neonates with late clamping was within the prespecified physiologic range.

The prevalence of anemia, defined as hematocrit less than 45%, was significantly lower in groups 2 and 3 than in group 1. The prevalence of hematocrit greater than 65% was similar in group 1 (4.4%) and in group 2 (5.9%) but significantly higher in group 3 (14.1%) than in group 1. Other neonatal outcomes and maternal postpartum hemorrhage were not significantly different in the 3 groups.

"Delayed cord clamping at birth increases neonatal mean venous hematocrit within a physiologic range," the authors write. "Furthermore, this intervention seems to reduce the rate of neonatal anemia. This practice has been shown to be safe and should be implemented to increase neonatal iron storage at birth."

The authors recommend controlled follow-up studies of the relationship between delayed cord clamping and the presence of anemia and iron status in infants.

"Another benefit of delayed clamping would be the increase of hematopoietic stem cells transfused to the newborn, which might play a role on different blood disorders and immune conditions," the authors conclude. "The advantages of umbilical cord clamping at least at 1 minute after birth could decrease the prevalence of iron-deficiency anemia in the first year of life, especially in populations with limited access to health care."

United Nations Children's Fund (UNICEF) Argentina supported this study. The authors have disclosed no financial relationships.

Pediatrics. 2006;117:e779-e786

Learning Objectives for This Educational Activity

Upon completion of this activity, participants will be able to:

- Compare the effect of early vs late umbilical cord clamping on neonatal venous hematocrit.
- Describe the effect of timing of umbilical cord clamping on clinical outcomes in term newborns and maternal postpartum hemorrhage.

Clinical Context

It is common practice to clamp the umbilical cord immediately, within 15 seconds, after birth. According to an observational study by Saigal and Usher in the 1977 issue of *Biology of the Neonate*, delayed umbilical cord clamping could increase the risk for polycythemia, respiratory problems, and hyperbilirubinemia. However, in a systematic review by Van Rheenen and Brabin in the March 2004 issue of the *Annals of Tropical Paediatrics*, they reported that late umbilical cord clamping helps to reduce iron deficiency anemia in infants.

The current study is a prospective, randomized, controlled trial to determine the effect of early vs delayed umbilical cord clamping on venous hematocrit and clinical outcomes in the term neonate as well as maternal postpartum blood loss.

Study Highlights

- 267 neonates who met enrollment criteria (uneventful cephalic vaginal or cesarean delivery; term singleton; no maternal clinical disease or complications; no evidence of congenital malformations or intrauterine growth restriction) were randomized to 1 of 3 different cord-clamping time intervals.
- 93 neonates had early cord clamping within first 15 seconds; 91 neonates had delayed cord clamping at 1 minute; 92 neonates had delayed cord clamping at 3 minutes.
- Baseline characteristics were similar: maternal age, parity, gestational age, antenatal visits, maternal anemia, cesarean delivery rates, third-stage active management, maternal hematocrit before birth, and newborn weight.
- At clinician's discretion, newborns assigned to delayed clamping group instead underwent early clamping if there was no spontaneous breathing in the first 10 seconds,

major congenital malformation, birth weight less than the tenth percentile, or tight nuchal cord.

- Primary outcome measure of newborn venous hematocrit at 6 hours of age was not significantly different for the groups: 53.5% for early clamping group; 57.0% for 1-minute group; 59.4% for 3-minute group.
- At 6 hours, anemia prevalence (venous hematocrit less than 45%) was higher in early clamping group (8.9%) vs 1-minute group (1%; *P* = .034) and 3-minute group (0%; *P* = .003)
- At 6 hours, polycythemia prevalence (hematocrit greater than 65%) was higher in 3-minute group vs early group (14.1% vs 4.4%; *P* =.039), but similar for 1-minute group (5.5%) and early group. None were symptomatic.
- At 24 to 48 hours, venous hematocrit values were similar for the 3 groups. Anemia prevalence was higher in the early group (16.8%) vs 1-minute group (2.2%; *P* = .0014) and 3-minute group (3.3%; *P* = .0027). Polycythemia prevalence was similar for the 3 groups.
- There were no significant differences for other secondary outcome measures: plasma bilirubin levels at 24 to 48 hours, neonatal morbidity (respiratory distress, tachypnea, grunting, jaundice, seizures, sepsis, necrotizing enterocolitis), mortality (none), neonatal intensive care unit admission, length of hospital stay, disease up to 1 month of age, weight or rate of breast-feeding at 1 month, maternal postpartum blood-loss volume, and maternal hematocrit level at 24 hours postpartum.

http://www.cochrane.org/reviews/en/ab003248.html

Early versus delayed umbilical cord clamping in preterm infants

Rabe H, Reynolds G, Diaz-Rossello J

Plain language summary

Delayed cord clamping for babies born early improves their health

In the womb, blood flows to and from the baby and the placenta bringing oxygen to the baby from the mother's blood. If the cord is left unclamped for a short time after the birth, some of the baby's blood from the placenta passes to the baby to help the flow of blood to the baby's lungs. In the review of studies on babies born prematurely, delaying cord clamping for just a very short time helped the babies to adjust to their new surroundings better. Further studies are needed on longer delays to see whether this brings even more benefits.