Cord Clamping—When? Why? & How?

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Effect of Language on person

- An English woman from England coming to India to stay in Bihar
- She wrote a Letter to Schoolmaster in Bihar
- Her stay was booked at Guest house locally owned by a school master
- Worried about toilet she wrote to him whether WC is available there
- WC (Water closet ) in England i.e Toilet
School master not fluent in English asked the local priest about the letter and meaning of WC.

What they concluded that WC means Wayside Church.

School master wrote:

Dear Madam,

I take great pleasure in informing you that WC is located 9 miles from house.

It is located in the middle of a groove of pine trees and surrounded by lovely grounds.

It is capable of holding 229 people and is open on Sundays and Thursdays.

As there are many people expected in Summer months I suggest to arrive early and there is plenty of standing room.
• My wife is ill recently so was unable to go. It has been a year since she last visited, which pains her greatly.
• I look forward to escorting you there myself and seating you in a place where you can be seen by all.
• Woman fainted after seeing the reply and she never visited India
Delayed Cord clamping

How many of us Practice?
Why You Should **DELAY CORD CLAMPING**

an easy decision for the health of your newborn

www.feedmememama.net
Case Scenario...

• Primi
• 28 yrs    IVF conceived
• 32 weeks of gestation
• Estimated weight of Fetus 1.2 KG
• PROM 2 days
• Having low grade fever
• Posted LSCS
Case Scenario...

- You are called for delivery
- Obstetricians is your spouse
- In your discussion with OBST.

- Ask provision of delayed cord clamping
- Should be discouraged as preterm
- High risk pregnancy so avoid
- High chances of PPH
Controversy / Myth

• Optimal time and whether to delay cord clamping, debate since centuries in literature
• Maternal mortality – PPH
• Nature’s provision
• Maternal and infant safety
• Many healthcare workers worldwide tend to clamp the cord and pass the baby off as quickly as possible
• Resource poor settings are the main victims of immediate clamping
• Cost-free means of small iron stores
• Infant anemia is associated with increased mortality and impaired mental and motor development
• Delaying clamping effective strategy to reduce anemia and improve child survival
Term infants >37 weeks

Delaying cord clamping for at least one minute

Higher early hemoglobin concentration

Increased iron reserves up to 6 months after birth

No difference in PPH rates

Higher birth weight

No statistically significant increase in jaundice or polycythemia
Hemodynamic...
From Placenta to Fetus...

<table>
<thead>
<tr>
<th>TIME AFTER CORD CLAMPING</th>
<th>PLACENTA</th>
<th>BABY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instantly –15 seconds after delivery</td>
<td>90ml</td>
<td>15ml</td>
</tr>
<tr>
<td>60 seconds after delivery</td>
<td>60ml</td>
<td>45ml</td>
</tr>
</tbody>
</table>

Figure 1: Delaying cord clamping means more blood for the baby and less for the placenta. ²
In placentofetal circulation Total blood volume is 120ml/kg of Fetus
A. Physiological cord clamping after ventilation
- PPV with intact umbilical cord in asphyxiated or preterm infants
- Onset of ventilation
- Spontaneous crying
- Increased pulmonary venous return
- LV preload
- UV
- IVC
- RA
- LA
- RV
- LV afterload
- Stable blood flow to the brain

B. Early cord clamping + impaired ventilation
- Depressed and asphyxiated or preterm infants without any breathing efforts
- Fluid-filled, unventilated lungs
- Low pulmonary venous return
- Pulmonary vasoconstriction
- Early cord clamping prior to ventilation of the lungs
- Decreased LV preload
- Increased afterload
- Decreased blood flow to the brain
- RA
- LA
- UV
- DA
- Early cord clamping
Case Scenario...

- 32 yrs  G2P1L1
- Delivered by NVD
- Cried immediate
- Respiratory distress after birth
- May need delivery room CPAP
- Delay Cord clamping

[ ] YES
[ ] NO
Why delay cutting your baby's cord?

Keeps mother and baby together for bonding

Keeps baby oxygenated while they learn to breathe

Baby receives full blood volume
  - Supplies extra iron
  - Maintains oxygen
  - Stem cells for healing

Traditional Wisdom
Evidence...

Recommendation

- Delayed cord clamping should be considered in every infant born in a resource poor setting, regardless of gestational age

  Grade of recommendation: Strong
DEVELOYED CORD CLAMPING

Late cord clamping (approximately one to three minutes after birth) is recommended for all births while initiating simultaneous essential newborn care.
- World Health Organization

Benefits

- Higher birth weight/
  Increased blood volume, oxygen levels, and nutrients
  *32% Higher Blood Volume

- Increased red blood cells, stem cells, and immune cells

- Increased iron stores/
  decreased risk for anemia
  *50% Reduced Risk For Anemia

"We must be very clear. This blood is not "cord" blood, it is baby blood! When we ask mothers to give away cord blood, they are under an illusion. This blood belongs to the baby, not the umbilical cord."
- Robin Lim

Northern Colorado Placenta Services
MEAN NEONATAL HB AT BIRTH

Figure 1: NB: $p = 0.008$. 

GROUP A

GROUP B
Transfusions

Analysis 01.02. Comparison 01 Early versus delayed cord clamping, Outcome 02 Transfused for anaemia

Review: Early versus delayed umbilical cord clamping in preterm infants.

Comparison: 01 Early versus delayed cord clamping
Outcome: 02 Transfused for anaemia

<table>
<thead>
<tr>
<th>Study</th>
<th>Early n/N</th>
<th>Delayed n/N</th>
<th>Relative Risk (Fixed)</th>
<th>Weight (%)</th>
<th>Relative Risk (Fixed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kinmond 1993</td>
<td>7/13</td>
<td>11/13</td>
<td></td>
<td>7.01</td>
<td>7.00 [1.00, 49.16]</td>
</tr>
<tr>
<td>McDonnell 1997</td>
<td>6/23</td>
<td>4/33</td>
<td></td>
<td>28.1</td>
<td>1.50 [0.49, 4.62]</td>
</tr>
<tr>
<td>Rabe 2000</td>
<td>16/20</td>
<td>9/19</td>
<td></td>
<td>64.9</td>
<td>1.69 [1.00, 2.65]</td>
</tr>
<tr>
<td>Total (95% CI)</td>
<td>56</td>
<td>55</td>
<td></td>
<td>100.0</td>
<td>2.01 [1.24, 3.37]</td>
</tr>
</tbody>
</table>

Total events: 79 (Early), 14 (Delayed)
Test for heterogeneity: chi-square = 2.24 df = 2 p = 0.32; I² = 11.5%
Test for overall effect: z = 2.81 p = 0.005
**Recommendations**

From 2012 *WHO guidelines on basic newborn resuscitation*:

- In newly born term or preterm babies who do not require positive-pressure ventilation, the cord should not be clamped earlier than 1 min after birth (*strong recommendation*).

- When newly born term or preterm babies require positive-pressure ventilation, the cord should be clamped and cut to allow effective ventilation to be performed (*conditional recommendation*).

- Newly born babies who do not breathe spontaneously after thorough drying should be stimulated by rubbing the back 2–3 times before clamping the cord and initiating positive-pressure ventilation (*conditional recommendation*).

From 2012 *WHO recommendations for the prevention and treatment of postpartum haemorrhage*:

- Late cord clamping (performed approximately 1–3 min after birth) is recommended for all births, while initiating simultaneous essential neonatal care (*strong recommendation*).

- Early umbilical cord clamping (less than 1 min after birth) is not recommended unless the neonate is asphyxiated and needs to be moved immediately for resuscitation (*strong recommendation*).

**In summary:**

- Delayed umbilical cord clamping (not earlier than 1 min after birth) is recommended for improved maternal and infant health and nutrition outcomes.
Delayed cord clamping till 60 secs in Term or Preterm, if infant is stable

Cord milking, still in research scenario

Updated guidelines 2015
Are we convinced?

- IVH
- NEC
- PDA
- Cardiac failure
- CLD
- Hyperbilirubinemia
- Polycythemia
- Mortality
Analysis 01.09. Comparison 01 Early versus delayed cord clamping, Outcome 09 Hyperbilirubinemia (treated)

Review: Early versus delayed umbilical cord clamping in preterm infants
Comparison: 01 Early versus delayed cord clamping
Outcome: 09 Hyperbilirubinemia (treated)

<table>
<thead>
<tr>
<th>Study</th>
<th>Early n/N</th>
<th>Delayed n/N</th>
<th>Relative Risk (Fixed) 95% CI</th>
<th>Weight (%)</th>
<th>Relative Risk (Fixed) 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fabe 2000</td>
<td>12/20</td>
<td>12/19</td>
<td>1.00 [0.95, 1.05]</td>
<td>100.0</td>
<td>1.00 [0.95, 1.05]</td>
</tr>
<tr>
<td>Total (95% CI)</td>
<td>20</td>
<td>19</td>
<td>1.00 [0.95, 1.05]</td>
<td>100.0</td>
<td>1.00 [0.95, 1.05]</td>
</tr>
<tr>
<td>Total events: 12 (Early), 17 (Delayed)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Test for heterogeneity not applicable
Test for overall effect z=0.20, p=0.8

Favours early clamp
Favours delaying
Inotropes requirement

### Analysis 01.11
Comparison 01 Early versus delayed cord clamping, Outcome 11 Inotropics for low blood pressure

**Review:** Early versus delayed umbilical cord clamping in preterm infants.

**Comparison:** 01 Early versus delayed cord clamping

**Outcome:** 11 Inotropics for low blood pressure

<table>
<thead>
<tr>
<th>Study</th>
<th>Early (n/N)</th>
<th>Delayed (n/N)</th>
<th>Relative Risk (Fixed) 95% CI</th>
<th>Weight (%)</th>
<th>Relative Risk (Fixed) 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>McDonnell 1997</td>
<td>3/23</td>
<td>2/23</td>
<td>1.50 [0.28, 8.16]</td>
<td>79.6</td>
<td>1.50 [0.28, 8.16]</td>
</tr>
<tr>
<td>Oh 2002</td>
<td>0/17</td>
<td>0/16</td>
<td>Not estimable</td>
<td>0.01</td>
<td>Not estimable</td>
</tr>
<tr>
<td>Rabe 2000</td>
<td>2/20</td>
<td>0/19</td>
<td>4.76 [0.24, 91.19]</td>
<td>214.4</td>
<td>4.76 [0.24, 91.19]</td>
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<tr>
<td>Total</td>
<td>60</td>
<td>56</td>
<td>2.17 [0.51, 9.12]</td>
<td>100.0</td>
<td>2.17 [0.51, 9.12]</td>
</tr>
</tbody>
</table>

Total events: 5 (Early), 2 (Delayed)

Test for heterogeneity: chi-square=0.45 df=1 p=0.50 I² = 0.0%

Test for overall effect: z=1.05 p=0.3

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Favours early clamp | Favours delaying
Analysis 01.12. Comparison 01 Early versus delayed cord clamping, Outcome 12 Patent ductus arteriosus

Review: Early versus delayed umbilical cord clamping in preterm infants
Comparison: 01 Early versus delayed cord clamping
Outcome: 12 Patent ductus arteriosus

<table>
<thead>
<tr>
<th>Study</th>
<th>Early n/N</th>
<th>Delayed n/N</th>
<th>Relative Risk (Fixed)</th>
<th>Weight (%)</th>
<th>Relative Risk (Fixed)</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>McDonnell 1997</td>
<td>3/23</td>
<td>3/23</td>
<td>1.00 [0.22, 4.45]</td>
<td>26.7</td>
<td>1.00 [0.22, 4.45]</td>
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<tr>
<td>Ch. 2002</td>
<td>4/17</td>
<td>6/16</td>
<td>1.61 [0.22, 1.82]</td>
<td>55.0</td>
<td>1.61 [0.22, 1.82]</td>
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</tr>
<tr>
<td>Rabe 2000</td>
<td>2/20</td>
<td>2/19</td>
<td>0.95 [0.15, 6.08]</td>
<td>18.3</td>
<td>0.95 [0.15, 6.08]</td>
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<tr>
<td>Total (95% CI)</td>
<td>60</td>
<td>18</td>
<td></td>
<td>100.0</td>
<td>0.79 [0.36, 1.72]</td>
<td></td>
</tr>
<tr>
<td>Total events: 9 (Early), 11 (Delayed)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Test for heterogeneity chi-square=0.11 df=2 p=0.86 P = 0.08
Test for overall effect z=0.60 p=0.5
Analysis 01.13. Comparison 01 Early versus delayed cord clamping, Outcome 13 Intraventricular haemorrhage

- Review: Early versus delayed umbilical cord clamping in preterm infants
- Comparison: 01 Early versus delayed cord clamping
- Outcome: 13 Intraventricular haemorrhage

<table>
<thead>
<tr>
<th>Study</th>
<th>Early n/N</th>
<th>Delayed n/N</th>
<th>Relative Risk (Fixed)</th>
<th>Weight (%)</th>
<th>Relative Risk (Fixed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hofmeyr 1988</td>
<td>1/13</td>
<td>8/23</td>
<td>3.22</td>
<td>32.2</td>
<td>2.21 [1.17, 4.17]</td>
</tr>
<tr>
<td>Hofmeyr 1993</td>
<td>11/46</td>
<td>8/40</td>
<td>1.20</td>
<td>47.7</td>
<td>1.20 [0.53, 2.68]</td>
</tr>
<tr>
<td>McDonnell 1997</td>
<td>1/16</td>
<td>0/15</td>
<td>2.9</td>
<td>2.9</td>
<td>2.82 [1.12, 6.43]</td>
</tr>
<tr>
<td>Oh 2002</td>
<td>4/17</td>
<td>2/16</td>
<td>1.14</td>
<td>1.14</td>
<td>1.88 [0.40, 8.90]</td>
</tr>
<tr>
<td>Rabe 20000</td>
<td>3/20</td>
<td>1/19</td>
<td>3.7</td>
<td>3.7</td>
<td>2.85 [0.92, 8.50]</td>
</tr>
<tr>
<td><strong>Total (95% CI)</strong></td>
<td><strong>1/12</strong></td>
<td><strong>1/13</strong></td>
<td></td>
<td><strong>100.0</strong></td>
<td><strong>1.74 [0.98, 2.81]</strong></td>
</tr>
</tbody>
</table>

Total events: 29 (Early), 19 (Delayed)
Test for heterogeneity chi-square: 1.68 df=4 p=0.79 P=0.09
Test for overall effect z=2.29 p=0.02
Death

Analysis 01.01. Comparison 01 Early versus delayed cord clamping, Outcome 01 Death of the baby

Review: Early versus delayed umbilical cord clamping in preterm infants
Comparison: 01 Early versus delayed cord clamping
Outcome: 01 Death of the baby

<table>
<thead>
<tr>
<th>Study</th>
<th>Early n/N</th>
<th>Delayed n/N</th>
<th>Relative Risk (Fixed) 95% CI</th>
<th>Weight (%)</th>
<th>Relative Risk (Fixed) 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hofmeyr 1988</td>
<td>0/14</td>
<td>5/24</td>
<td></td>
<td>50.8%</td>
<td></td>
</tr>
<tr>
<td>Hofmeyr 1993</td>
<td>1/40</td>
<td>1/46</td>
<td></td>
<td>11.4%</td>
<td>1.15 [0.07, 1.80]</td>
</tr>
<tr>
<td>Kimmond 1993</td>
<td>0/19</td>
<td>0/17</td>
<td></td>
<td>0.0%</td>
<td>Not estimable</td>
</tr>
<tr>
<td>McDonnell 1997</td>
<td>2/23</td>
<td>0/23</td>
<td></td>
<td>6.2%</td>
<td>5.00 [0.25, 98.75]</td>
</tr>
<tr>
<td>Ch 2002</td>
<td>3/17</td>
<td>2/16</td>
<td></td>
<td>25.4%</td>
<td>1.41 [0.27, 7.38]</td>
</tr>
<tr>
<td>Rabe 2000</td>
<td>1/20</td>
<td>0/19</td>
<td></td>
<td>6.7%</td>
<td>2.86 [0.12, 66.3]</td>
</tr>
<tr>
<td>Total (95% CI)</td>
<td>13/110</td>
<td>145</td>
<td></td>
<td>1000.0</td>
<td></td>
</tr>
</tbody>
</table>

Total events: 7 (Early), 8 (Delayed)

Test for heterogeneity chi-square = 1.37 df = 4 p = 0.50 I² = 0.0%
Recommendation

- Cord clamping should be delayed for at least three minutes for the optimal volume of placental transfusion, regardless of fetal weight.

Grade of recommendation: Weak.
Recommendation

- When the state of the infant does not allow a clamping delay of three minutes, aim for a delay of at least 60 seconds with the infant placed between the mother’s legs

   Grade of recommendation: Weak
Case Scenario...

- 38 yrs old  
- Primi  
- Post dated  
- Fetal distress  
- MSL  
- Emergency LSCS  
- Did not cry immediately  
- Will you go Delayed Cord Clamping  

[YES]  
[NO]
7. When immediate neonatal resuscitation is required, place the child between the legs of the mother, start positive pressure ventilation with the umbilical cord intact and delay clamping for at least 60 seconds.

Level of evidence: Very low
Recommendation

- Delayed cord clamping should be combined with the administration of oxytocin immediately after delivery of the infant to reduce maternal blood loss in the third stage of labour

   Grade of recommendation: Strong
Adequate transfusion within +10 to -10 cm/ nothing >40cm above/ and in a minute if 40 cm below

<table>
<thead>
<tr>
<th>Position of infant in relation to placenta</th>
<th>Time to cord clamping (minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1-2</td>
</tr>
<tr>
<td>&gt;10 cm above</td>
<td>Ceriani Cernadas et al\textsuperscript{16}</td>
</tr>
<tr>
<td>0-10 cm below</td>
<td>Chaparro et al\textsuperscript{6}</td>
</tr>
<tr>
<td>30 cm below</td>
<td>Saigal et al\textsuperscript{15}</td>
</tr>
</tbody>
</table>
Delayed cord clamping should be considered in every infant born in a resource poor setting, regardless of gestational age

DO IT

Delayed cord clamping should be combined with the administration of oxytocin immediately after delivery of the infant to reduce maternal blood loss

DO IT

Cord clamping should be delayed for at least three minutes for optimal blood transfusion from the placenta, regardless of fetal weight

PROBABLY DO IT

When the state of the infant does not allow a clamping delay of three minutes, aim for a delay of at least 60 seconds with the infant placed between the mother’s legs

PROBABLY DO IT

Proceed with controlled cord traction after clamping the umbilical cord

Fig 2: Guidelines for cord clamping in resource poor settings
Cord clamping
FIGURE 3. Density plots demonstrating distribution of the timing of umbilical cord clamping (in seconds) before and after an intervention to change hospital practice from early to delayed cord clamping, Iquitos, Peru, May–July 2009.
If this benefits babies,

Immediate drying, delayed cord clamp

Skin-to-Skin Contact

Why is this so common?

Immediate cord clamp, delayed drying, suction

Separated from mother
# Take Home

<table>
<thead>
<tr>
<th>TABLE 2</th>
<th>State of the science on delayed umbilical cord clamping</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Term Neonate</strong></td>
<td><strong>Preterm Neonate</strong></td>
</tr>
<tr>
<td><strong>Main Benefits</strong></td>
<td>• Lower risk of iron deficiency at age 6 months</td>
</tr>
<tr>
<td></td>
<td>• Lower risk of needing inotropic medications</td>
</tr>
<tr>
<td></td>
<td>• Lower risk of intraventricular hemorrhage</td>
</tr>
<tr>
<td><strong>Main Drawbacks</strong></td>
<td>• Increased risk of hyperbilirubinemia requiring phototherapy</td>
</tr>
<tr>
<td><strong>Length of Delay</strong></td>
<td>• Typically 2–3 minutes; range 1–5 minutes</td>
</tr>
<tr>
<td><strong>Positioning of Infant</strong></td>
<td>• Understudied</td>
</tr>
<tr>
<td></td>
<td>• Position of term neonate before umbilical cord clamping does not affect volume of placental transfusion</td>
</tr>
<tr>
<td><strong>Cautions</strong></td>
<td>• Significant maternal anemia</td>
</tr>
<tr>
<td></td>
<td>• Meconium stained fluid</td>
</tr>
<tr>
<td></td>
<td>• Repetitive decelerations, fetal bradycardia, or other concern for fetal well-being</td>
</tr>
<tr>
<td></td>
<td>• Known maternal infectious diseases (ie, HIV, hepatitis)</td>
</tr>
<tr>
<td><strong>Situations in Which Risks Likely Outweigh Benefits</strong></td>
<td>• Absent- or reversed-end-diastolic umbilical artery cord Dopplers on prenatal ultrasound</td>
</tr>
<tr>
<td></td>
<td>• Neonate with severe depression at birth (ie, heart rate &lt;60 beats per minute, suspected severe asphyxia)</td>
</tr>
<tr>
<td></td>
<td>• Placental abnormalities: severe abruption, accreta, percreta, vasa previa</td>
</tr>
<tr>
<td></td>
<td>• Multiple gestations</td>
</tr>
<tr>
<td></td>
<td>• Fetal anomalies that require immediate resuscitation (eg, congenital diaphragmatic hernia)</td>
</tr>
</tbody>
</table>
Thanks