Hilary Butler

From: Hilary Butler [butler@watchdog.net.nz]
Sent: Saturday, 8 August 2009 8:53 p.m.
To: 'Hilary Butler'
Subject: time line of cord cutting

History

This is a documented history of accepted methods, and their rationale, of closing the umbilical circulation after birth, when the newborn child converts from the placental life support system to the independent life support systems of the adult human. The natural (physiological) process was clearly understood by obstetricians from 1773 through the 1970's. G. M. Morley, MB ChB

1773 "The common method of tying and cutting the navel string in the instant the child is born, is likewise one of those errors in practice that has nothing to plead in its favour but custom. Can it possibly be supposed that this important event, this great change which takes place in the lungs, the heart, and the liver, from the state of a foetus, kept alive by the umbilical cord, to that state when life cannot be carried on without respiration, whereby the lungs must be fully expanded with air, and the whole mass of blood instead of one fourth part be circulated through them, the ductus venosus, foramen ovale, ductus arteriosus, and the umbilical arteries and vein must all be closed, and the mode of circulation in the principal vessels entirely altered - Is it possible that this wonderful alteration in the human machine should be properly brought about in one instant of time, and at the will of a by-stander?"
"**A Treatise on the Management of Pregnant and Lying-In Women**" by Charles White, published in **1773.**

1801 *"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, a portion of the blood being left in the placenta, which ought to have been in the child."*

Erasmus Darwin, (Charles Darwin's grandfather) Zoonomia, 1801; Vol. III page 321

1842 Meigs: Regarding clamping a cord around the neck:
"The head is born: perhaps the cord is turned once, or even more than once around the child's neck, which it encircles so closely as to strangulate it. Let the loop be loosened to enable it to be cast off over the head. … [or] by slipping it down over the shoulders. … If

this seems impossible, it should be left alone; and in the great majority of cases, it will not prevent the birth from taking place, after which the cord may be cast off. … Should the child be detained by the tightness of the cord, as does rarely happen, … the funis may be cut … Under such a necessity as this, a due respect for one's own reputation should induce him to explain, to the bystanders, the reasons which rendered so considerable a departure from the ordinary practice so indispensable. I have known an accoucheur's capability called harshly into question upon this very point of practice. I have never felt it necessary to do it but once. … The cord should not be cut until the pulsations have ceased."
Meigs C. Professor of Obstetrics and Diseases of Women and Children, Jefferson Medical College. **A Philadelphia Practice of Midwifery, 1842**

1850 Churchill F (1850) On the Theory and Practice of Midwifery. London: Henry Renshaw.

p 91 (#181 The umbilical cord, funis, or navel string) "After birth of the child, the pulsation ceases in about fifteen or twenty minutes, and that portion of the cord which remains attached to the umbilicus dies, and gradually withers, until it falls off, in the majority of cases, on the fifth or sixth day."

p 131 "…in ordinary cases, if we find that the cord is twisted around the neck, all we need do is to draw down more of the cord, and either slip the lop over the head or shoulders. If we cannot do this, we must loosen the cord as much as we can, so as to prevent the strangulation of its vessels, and wait for the uterus to expel the child."

p 132 "If the child be healthy, and not have suffered from pressure, &c. it will cry as soon as it is born, and when respiration is established, it may be separated from its mother…"

1871 Cazeaux P (1871) A Theoretical and Practical Treatise on Midwifery. Fifth American from the Seventh French Edition by Wm R Bullock, MD. Philadelphia: Lindsay and Blakiston.

p. 406 "…the circulation existing between it [the child] and the placenta is observed to continue for some time… pulsations in the arteries gradually cease, commencing at their placental extremity; and some authors have advised this event to be waited for before cutting the cord…"

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http://web.archive.org/web/20041011050220/www.cordclamping.com/History.htm

1882 Lusk WT (**1882**) The Science and Art of Midwifery. New York: D Appleton and Company, pp214-215

"Infants which have had the benefit of late ligation of the cord are red, vigorous, and active, whereas those in which the cord is tied early are apt to be pale and apathetic."

"1. The cord should not be tied until the child has breathed vigorously a few times. When there is no occasion for haste, it is safer to wait until the pulsations of the cord have ceased altogether.

2. Late ligation is not dangerous to the child. The child receives into its system only the amount of blood required to supply the needs created by the opening up of the pulmonary circulation."

1910 Jellett, Henry (1910) 25.a.1910.1
A Manual of Midwifery for Students and Practitioners. New York: William Wood & Company MDCCCCX

p. 350
"As soon as the child is born, its eyes are wiped, any mucus in the air passages is removed, and it is placed in a convenient position between the patient's legs. The cord is tied as soon as it has stopped pulsating, and the infant is then removed."

1917 Williams JW (**1917**) Obstetrics: A Text-Book for the Use of Students and Practitioners, Fourth Edition, pp342-343

"Immediately after its birth the child usually makes an inspiratory movement and then begins to cry. In such circumstances it should be placed between the patient's legs in such a manner to have the cord lax, and thus avoid traction upon it. "

"Normally the cord should not be ligated until it has ceased to pulsate.."

"I have always practiced late ligation of the cord and have seen no injurious effects following it, and therefore recommend its employment, unless some emergency arises which calls for earlier interference."

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1921 von Reuss, August Ritter (1921) WS 420 R446d 1921
The Diseases of the Newborn. New YorkL William Wood & Co, MCMXXI
(Vienna, January 1914)

p. 419 – "… A compromise is usually adopted, in that the cord is not tied immediately after birth, nor does one wait till the expression of the placenta, but only until the cessation of pulsation in the cord, an average of five to ten minutes."

1927 Willaims, J. Whitridge (1927) 25.A.1927.2
Obstetrics: A Textbook for the use of Students and Practitioners, Fifth enlarged and revised edition. D. Appleton and Company, New York/London, 1927

Schücking. Berliner Klin Wochenschr 1877 xiv, 5,18 "Zur Physiologie der Nachgeburtsperiode."

Budin:
Obstetrique et Gynécologue, 1886, 1-35
Le Progrès Médical, 1875, decembre; 1876 janvier "À quel moment doite on opérer la ligature du cordon ombilibale?"

P 359 –
"I have always practiced late ligation of the cord and have seen no injurious effects following it, and therefore recommend its employment, unless some emergency arises which calls for earlier interference…"

1930 DeLee JB (1930) The Principles and Practice of Obstetrics. Philadelphia and London: WB Saunders Company.

"p. 330 "Tying the cord. – After waiting until the pulsation in the exposed umbilical cord has perceptibly weakened or disappeared, the child is severed from its mother. Until the cord is severed the child is still part of its mother and has no legal existence… During the four or eight minutes while waiting to tie the cord the child obtains from 40 to 60 gm. Of the reserve blood of the placenta – a fact that was first shown by Budin. The blood is pressed into the child by the uttering contractions, and part is aspirated by the expanding chest. This extra blood the child needs in its first days of life, and observation has shown that such children lose less in weight and are less subject to disease…"

1933 Curtis AH, ed (1933)
Obstetrics and Gynecology (3 vols). Philadelphia & London: WB Saunders Company.

Baer JL Chapt XXIV – The conduct of normal labor pp 702-844.
P 828 – "In most clinics the cord is not tied until pulsation has ceased. This is based on the accepted fact that the delay provides the infant with an additional average of 60 to 90 cc of blood. With premature infants or twins, most of which are usually below the weights of average single infants, this additional blood is a distinct advantage. In full-term infants of normal size the advantage is more theoretical than real."

1936 DeLee, Joseph B (1936) 25.A.1936.6
The Principles and Practice of Obstetrics, Sixth Edition. Philadelphia and London: W.B. Saunders Company, 1956.
[earlier editions: 1913, 15, 18, 24, 28, 33 (6^{th}) → reprinted in 34 & 36]

p. 334 – "After waiting until the pulsation in the exposed umbilical cord has perceptibly weakened or disappeared, the child is severed from its mother."

"During the four or eight minutes while waiting to tie the cord the child obtains from 40 to 60 gm of the reserve blood of the placenta – a fact that was first shown by Budin. The blood is pressed into the child by the uterine contractions, and part is aspirated by the expanding

chest. This extra blood the child needs in its first days of life, and observation has shown that such children lose less in weight and are less subject disease. It is an error, on the other hand, to force the blood of the placenta into the child by stripping the cord toward the child. This overloads its blood vessels, causes icterus, melena, even apoplexy …"

1937 Fitzgibbon, Gibbon (1937) 25.A.1937.2
Obstetrics. Browne and Nolan Limited, Dublin/Belfast/Cork/Waterford, 1937.

p. 116 – Lateral position

p. 128 "…If the infant has cried and has respired well for about five minutes, there is no advantage in leaving at attached any longer to the placenta. Its pulmonary circulation has been opened up and the pulmonary vessels filled with blood …"

1944 Read, Grantly Dick (1944) 25.B.1944.2
Childbirth Without Fear: The principles and practice of natural childbirth. Harper & Brothers Publishers, New York and London, 1944.

P 95 – "It is my custom to lift up the crying child, even before the cord is cut …"

"Its first cry remains an indelible memory on the mind of a mother; it is the song which carried her upon its wings to an ecstasy mere man seems quite unable to comprehend."

1950 Eastman HJ (1950) Williams Obstetrics, Tenth Edition, pp 397-398

"Whenever possible, clamping or ligating the umbilical cord should be deferred until its pulsations wane or, at least, for one or two minutes."

"There has been a tendency of late, for a number of reasons, to ignore this precept. In the first place the widespread use of analgesic drugs in labor has resulted in a number of infants whose respiratory efforts are sluggish at birth and whom the obstetrician wishes to turn over immediately to an assistant for aspiration of mucus, and if necessary, resuscitation. This readily leads to the habit of clamping all cords promptly."

1951 Greenhill JP (1951) 25.A.**1951**.2)
Principles and Practice of Obstetrics; originally by Joseph
B. DeLee, M.D., Tenth Edition. W.B. Saunders Company, Philadelphia and London, 1951.

p.251 "After waiting until the pulsation in the exposed umbilical cord has ceased, the child is severed from its mother."

"DeMarsh, Alt, Windle and Hillis showed that those infants whose cords were not clamped until the placenta had separated from the uterus had on average 0.556 million more erythrocytes per cubic millimeter and 2.6 gm more hemoglobin per 100cc during the first week than those whose cords were clamped immediately. These authors maintained that early clamping of the umbilical cord is equivalent to submitting the child to a hemorrhage at

birth. Wilson, Windle and Alt found that infants whose umbilical cords were clamped immediately after birth had a lower mean corpuscular hemoglobin at eight and ten months of age than those whose cords were clamped after the placenta began to descend into the vagina. It was suggested then that early clamping of the cord may lead to an iron deficiency during the first year of life."

"McCausland, Holmes and Schumann advise stripping the cord and placental blood into the infant because it is harmless if done gently and because term babies receive about 100cc of extra blood in this way. These authors claim that babies receiving this blood had higher erythrocyte counts, higher hemoglobin values, higher initial weights and less initial weight losses."

1952 Greenhill, JP (1955) WQ 100 G812p **1955**
Obstetrics Eleventh Edition WB Saunders Company, Philadelphia and London.
[1913, 15, 18, 24, 28, 33, 38, 43, 47, 51]
1 2 3 4 5 6 7 8 9 10

p 280-282 - "Immediately after the baby is delivered it should be held well below the level of the vulva for a few minutes or placed in a warm container the level of which is considerably below the mothers' buttocks (Fig 279). The purpose of keeping the baby at this level is to permit the blood in the placenta to get to the baby. Dieckmann and associates maintain that this procedure will add from 50 to 75 percent of the blood in the placenta and cord to the newborn child. If the placenta separates while waiting, expressing it from the uterus and holding it elevated for two or three minutes will accomplish the same purpose. The cord is cut after about three minutes or after it collapses. If the baby is in a special container, it is left in until after the cord is cut. As soon as possible after delivery any mucus in the air passages must be removed with a soft rubber bulb or a tracheal catheter.

Tying the Cord. After waiting until the pulsation in the exposed cord has ceased, using dull scissors, the child is severed from its mother. With a piece of linen bobbin, coarse silk, rubber band or any sterile strong string, the cord is ligated close to the cutaneous margin of the umbilicus , making sure that there is no umbilical hernia which might allow a loop of intestine to be caught in the grasp of the ligature. It is important to leave as little as possible of the cord to be cast off except when a baby has erythroblastosis…"

"DeMarsh, Alt, Windle, and Hillis showed that infants whose cords were not clamped until the placenta had separated from the uterus had an average of 0.56 million more erythrocytes per cubic millimeter and 2.6 gm. More hemoglobin per 100 ml. during the first week than those whose cords were clamped immediately. These authors maintained that early clamping of the cord is equivalent to submitting the child to a hemorrhage at birth. Wilson, Windle and Alt found that infants whose umbilical cords were clamped immediately after birth had a lower mean corpuscular hemoglobin at 8 and 10 months of age than those whose cords were clamped after the placenta began to descend into the vagina. Thus early clamping of the cord may lead to an iron deficiency during the first year of life. McCausland, Holmes and Schumann advise stripping the cord and placental blood into the infant because it is harmless if done gently and because term babies receive about 100 ml of extr blood in this way. Babies receiving this blood have higher erythrocyte counts, higher hemoglobin valuies, higher initial weights and less initial weight losses."

Dieckmann, WJ, Forman JB, and Philips GW: Effects of Intravenous Injections of Ergonovine and Solution of Posterior Pituitary Extract on the Postpartum Patient. Am. J. Obst. & Gynec 60:655 (Sept) **1950**.

p 281 – "After waiting until the pulsation in the exposed cord has ceased, using dull scissors, the child is severed from its mother."

P 832 – "In attempting to account for the death of babies delivered by cesarean section, Landau and associates concluded that blood loss to the child incurred by immediate clamping of the cord amounted to 90 ml, a quantity of definite significance, especially in preterm infants. Improvement was noted in the condition of babies when drainage of blood from the placenta, after its removal, was facilitated by suspending it in a towel above the child for six to ten minutes or until the cord vessels collapsed."

Landau DB et al. (1950) J. Pediat 36:421, April **1950**.

1958 Willson JR, Beecham CF, Forman I, Carrington ER (1958) WP 100 x02 1958 Obstetrics and Gynecology. The CV Mosby Company, St. Louis, 1958

P 337 –
"The baby is held with its head downward for a few seconds while the cord is stripped from the introitus toward the infant several times. This adds 75 or more ml of blood, which would otherwise be discarded with the placenta, to the infant's vascular system."

P 373 –
"The blood in the fetal circulation is distributed between the vessels in the infant's body and those in the placenta …"

"…At the end of the second trimester about half the total blood is in the placenta, but as the baby grows larger relatively more is contained in the infant itself. The blood volume of the newly born baby is only about 250 ml. Consequently as much as possible must be preserved.

If clamping and ligation of the cord are delayed for several minutes after the baby is born, as much as 100 ml of blood will be transferred from the placenta to the baby. The same result can be obtained by stripping the cord from the vulva toward the infant repeatedly until no more blood enters the vessels from the placental end."

1965 Greenhill JP (1965) WQ 100 G 812p **1965**
Obstetrics: Froim the original text of Joseph B. DeLee, MD. Thirteenth Edition. W.B. Saunders Company, Philadelphia & London.
[1913, 15, 18, 24, 28, 33, 38, 43, 47, 51, 55, 60]
1 2 3 4 5 6 7 8 9 10 11 12

p 376 – "After pulsation in the exposed cord has ceased, using dull scissors, the child is separated from its mother."

1966 Taylor, E. Stewart (1966) WQ 100 B40 **1966**
Beck's Obstetrical Practice, Eight Edition. The Williams & Wilkins company, Baltimore, 1966.

p. 202 – "After delivering the child, the obstetrician suspends it by its feet … During this time the fluid within the tracheobronchial tree may be expelled by gravity. Most infants take their first extrautering gasp at this time, and it is well to have the trachea clear."

"If the obstetrician waits until the cord stops pulsating, the child receives a considerable amount of blood (up to 100 ml). This procedure is harmless to the normal infant and may be beneficial. However, the extra blood volume from the placenta may be detrimental in some pathological conditions of the infant. The most notable of these are maternal-fetal blood group incompatibilities, anomalies of the infant cardiovascular system, or severe fetal asphyxia."

"In normal full-term deliveries, the cord is clamped with two hematostats as soon as the cord stops pulsating."

1966 Fitzpatrick E, Eastman NJ, Reeder SR (1966)
Maternity Nursing, Eleventh Edition, JB Lippincott Company, Philadelphia, Toronto, 1966.
[1929, 33, 34, 37, 40, Zabriskie's Handbook of Obstetrics, 1st to 6th editions by Louise Zabriskie]
[1943, 48, 52, 7th to 9th editions, Zabriskie's Obstetrics for Nurses, Tenth Edition, 1960, by Elise Fitzpatrick & Nicholson J. Eastman]

p 268 –
"…The infant usually cries immediately, and the lungs become expanded; about this time the pulsations in the umbilical cord begin to diminish. The physician usually will defer clamping the cord until this occurs, or for a minute or so if practicable, because of the marked benefit of the additional blood to the infant."

P 288 (emergency delivery) –
"There is no hurry to cut the cord, so this should be delayed until proper equipment is available. It is a good plan to clamp the cord after pulsations cease (but not imperative at the moment) and to wait for the physician to cut the cord after he arrives."

1969 James LS (**1969**) Resuscitation of the newborn, in DE Reid and TC Barton, eds, Controversy in Obstetrics and Gynecology. Philadelphia, London, Toronto: WB Saunders Company, pp 220-221.
"In infants delivered by cesarean section, hemoglobin, hematocrit value, and blood pressure have frequently been found to be lower than in infants delivered per vaginum … due to a loss of blood into the placenta, since the uterus is not contracting."

"Asphyxiated newborn monkeys resuscitated before the last gasp show little or no cerebral damage. On the other hand prolongation of asphyxia for as short a period as four minutes after the last gasp is accompanied by widespread tissue damage and abnormal behavior in the surviving animals. Thus for the newborn monkey the 'safe' period of anoxia is short if functional integrity is to be maintained."

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1976 Beischer, Norman A & MacKay Eric V. (1976) WQ 100 B 4230 1976
Obstetrics and The Newborn: For midwives and medical students. W.B. Saunders: Sydney, Philadelphia, Toronto, London, 1976

P 261 - "The umbilical cord is usually clamped some 30 seconds after delivery, after nasopharyngeal aspiration has been carried out."

p. 259 – illustration 41.6
"J. The mother has been turned into the dorsal position and the cord is checked for pulsations.

K. The cord is divided between clamps, or, alternatively, when pulsations cease, the cord is clamped close to the baby's umbilicus using the plastic device shown in figure 41.6 L."

P 395 – "The optimal time for clamping (or tying) the cord is not known for certain. Late clamping of the cord results in an additional volume of blood reaching the infant. This is harmful in premature and erythroblastotic infants. In the asphyxiated infant, early clamping allows rapid transfer of the child for resuscitation purposes. In other patients, the cord is clamped when pulsations cease."

1983 **Bodyazhina V (1983)** WQ 100.3 B667u 1983
Textbook of Obstetrics: Translated from the Russian by Alexander Rosinkin (revised from the 1980 edition). Mir Publishers, Moscow

P 156 - "The umbilical cord should be tied up after its vessels stop pulsating, which occurs in 2-3 min following the delivery of the infant. In the course of a few minutes that the umbilical cord pulsates, from 50 to 100 ml of the blood is delivered into the vascular system of the foetus from the placenta. As soon as the pulsation discontinues, the cord should be cut off and tied up in asceptic conditions."

1986 Beischer, Norman A & MacKay Eric V (1986) WQ 100.3 B 4230 1986
Obstetrics and the Newborn: An illustrated textbook, Second Edition. WB Saunders Company, Sydney, Philadelphia, London, Toronto, Tokyo, Hong Kong, 1986.

p. 381 - The optimum time of clamping is 30-60 seconds after birth: This will provide some 80 ml of extra blood to the baby. Excess blood volume in the baby can be a disadvantage,

producing polycythemia and hyperviscosity, with such attendant problems as respiratory distress, heart failure, jaundice, convulsions and apathy."

p. 546 – "The optimal time for clamping (or tying) the cord is not known for certain. Late clamping of the cord results in an additional volume of blood reaching the infant. This may result in hyperviscosity, jaundice and cardiorespiratory, neurological and renal problems. The extr blood specifically aggravates jaundice in premature infants and in those with erythroblastosis, so early clamping of the cord is advised in such infants."

P 710 –
Q. What is the significance of continued pulsation of the arteries in the umbilical cord at birth?
A. It means that respiration has not commenced. The physiological stimulus causing closure of umbilical arteries (and ductus arteriosus) is an increase in oxygen saturation of the blood which occurs when the lungs expand with air."

P 710 –
Q. What is the significance of continued pulsation of the arteries in the umbilical cord at birth?
A. It means that respiration has not commenced. The physiological stimulus causing closure of umbilical arteries (and ductus arteriosus) is an increase in oxygen saturation of the blood which occurs when the lungs expand with air."

P470 –
"Apgar scores are recorded at 1 minute and again at 5 minutes, timing the observations accurately (see chapter 43, table 43.1). Also the time to first breath and time to the establishment of regular respirations are recorded."

"Permanent cord clamps or ligatures (Figure 26.27) or special bands are applied to the umbilical cord as soon as possible after birth…"

pp 734-5
"Routine practices concerning the time for clamping the umbilical cord vary. If the child's condition is satisfactory cord clamping and severing can be delayed until pulsation has stopped and the infant is position at or below the level of the mother. The additional blood transfused from the placenta can be as much as 100 ml. The benefits of this are not fully evaluated but the additional volume may be harmful in preterm infants. Early clamping facilitates prompt resuscitation, if required, and transfer to the mother's arms…"

Apgar score:	0	1	2
Heart rate	absent	less than 100	greater than 100
Respiratory effort	absent	slow, irregular	good, crying
Colour	blue or pale	pink body, blue extremities	pink

Muscle tone	limp	flexion of extremities	active
Response to nasal catheter	nil	grimace	cough or sneeze

1987 (3rd ed) p 258 – Needs of the term infant, by Ernest N. Kraybill
"… with present information it seems reasonable to avoid the extremes of immediate and of very late clamping. The first 30 to 60 seconds after delivery are well spent in suctioning the airway … The normal newborn invariably cries during this interval …"

1988 Hibbard, Bryan M (**1988**) WQ 100.3 H624p 1988
Principles of Obstetrics. Butterworths, London, Boston, Durban, Singapore, Sydney, Toronto, Wellington.

P 470
"Apgar scores are recorded at 1 minute and again at 5 minutes, timing the observations accurately (see chapter 43, Table 43.1). Also the time to first breath and time to the establishment of regular respirations are recorded."

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1994 McGregor Kelly, Joan WS 420 N441 1987, **1994**
General Care (chapt 22) in Avery GB, /fletcher MA, MacDonald MG, eds . Neonatology, Pathophysiology and Management of the Newborn, Fourth Edition. J.B. Lippincott Company, Philadelphia, 1994 (1987, 1981, 1975)

P. 301 cites Cunningham et al. (Williams Obstetrics, 18th ed.)
"…As soon as possible after suctioning, the cord is clamped…"

"… consequences of a significant shift [of blood volume] toward the infant include polycythemia, circulatory volume overload, and hyperbilirubinemia, and these generally outweigh any potential advantage of augmenting the infant's iron reserve…"

1991 ACOG Committee opinion: Bulletin 138 – April 1994 (replaces #91, February 1991) (re-affirmed February 2002)

Utility of Umbilical Cord Blood Acid-Base Assessment

"TECHNIQUE
Immediately after delivery of the neonate, a segment of umbilical cord should be doubly clamped, divided, and placed on the delivery table pending assessment of the five minute Apgar score."

1981 *"Immediate cord clamping before the child has breathed should be avoided … in certain unfavorable conditions the consequences may be fatal."*

Peltonen T. **Placental Transfusion, Advantage - Disadvantage**. Eur J Pediatr. **1981**;137:141-146

1982 *Immediate cord clamping can result in hypotension, hypovolemia and anemia …*"
Linderkamp O. **Placental transfusion: determinants and effects**. Clinics in Perinatology **1982;**9:559-592

1993*"[Delayed clamping, as opposed to immediate clamping,] has clinical and economic benefits."*
Kinmond S et al. **Umbilical Cord Clamping and Preterm Infants: a Randomized Trial**. BMJ **1993**; 306: 172-175

1998 *"To avoid injury in all deliveries, especially those of neonates at risk, the cord should not be clamped until placental transfusion is complete."*
Morley G.M. **Cord Closure: Does Hasty Clamping Injure the Newborn?** OBG MANAGEMENT **1998**; July 29-36.

This list has been compiled mainly by Eileen Simon from the Harvard Medical School Library.