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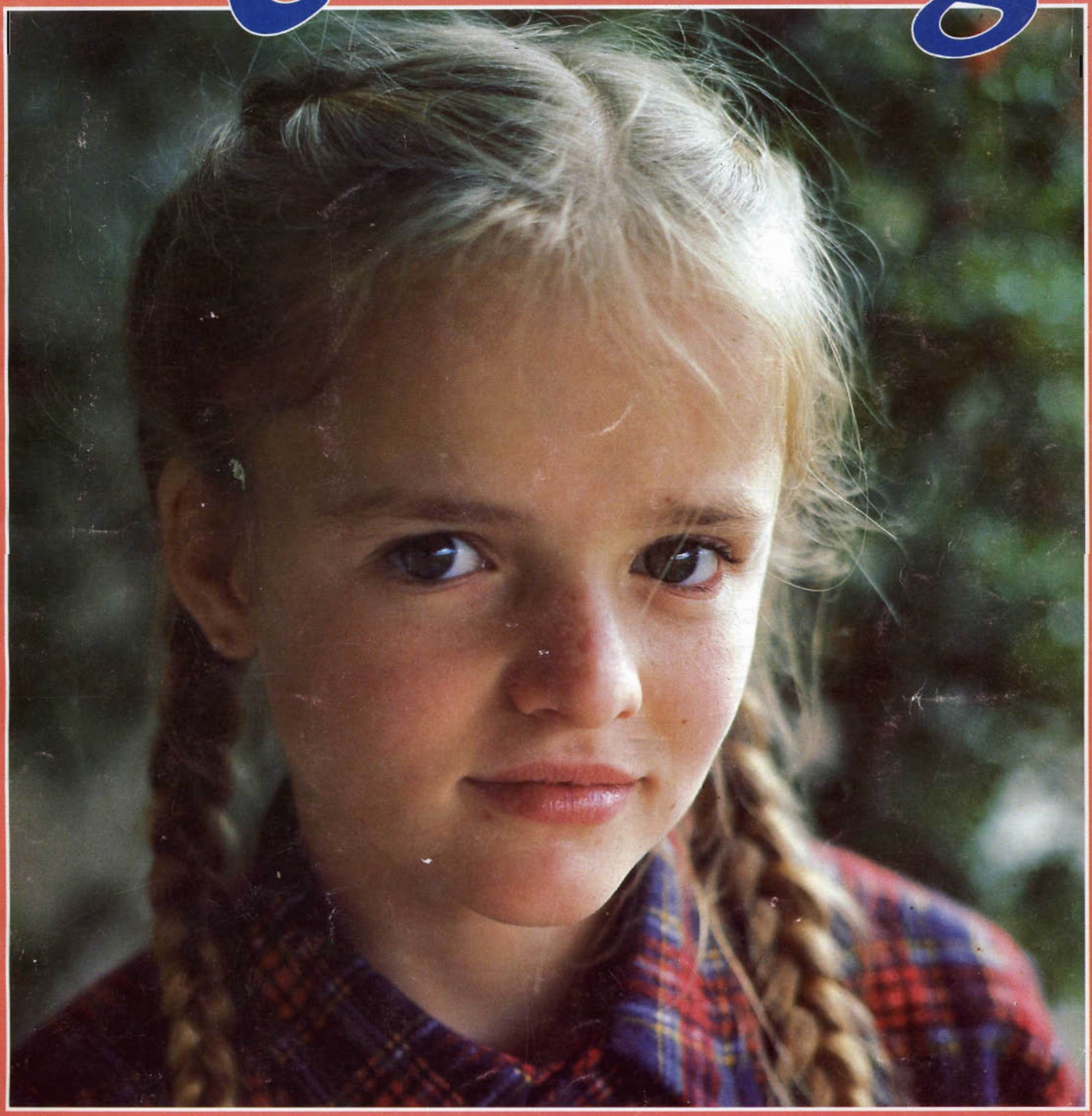

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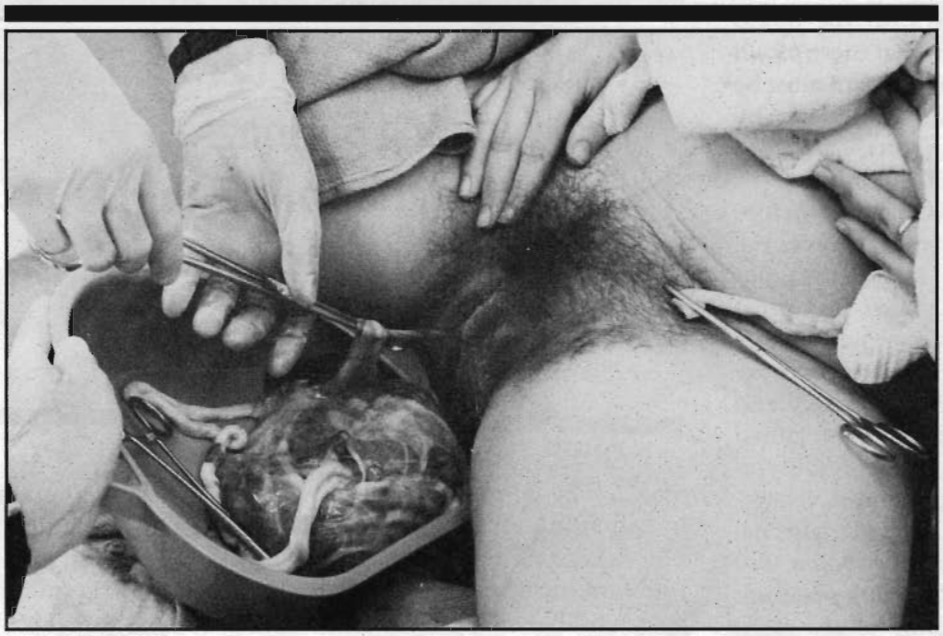

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DELAYED CORD CLAMPING

HILARY BUTLER

Literature describing the consequences of early clamping of the umbilical cord is scant. The ramifications of this routine procedure are, however, potentially serious. The majority of cultures, when left to their own traditional birthing practices, retain an appreciation for the way nature has equipped a woman's body to deal with placental delivery. In South Africa, for example, the Bantu people will not touch the cord until the placenta is expelled.[1] On the other hand, among cultures which have taken up active management of the third stage of labor, much of this appreciation has been lost. In 1737, Monsieur François Mauriceau published a manual advising that the cord be immediately knotted and cut, and recommending that the "patient" be subsequently relieved of the placenta—for fear that the uterus might close—by turning the cord two or three times around the left hand, pushing the fingers of the right hand into the vagina to keep the uterus up, and pulling the placenta out.[2] Although practitioners in the maternity field today do not go to such extremes, they have been trained to believe that cutting the cord before delivering the placenta benefits the baby. Evidence to the contrary begs us to take a new look at this practice.

Expulsion of the Placenta

The function of uterine contractions in the third stage of labor is to separate the placenta from the wall of the uterus, expel it, and control hemorrhage.[3] This is effected by contraction and retraction.

At delivery there is already microseparation of the placenta due to the retraction that has taken place during pushing. While the surface of the uterine wall to which the placenta adheres does shrink, the placenta itself cannot reduce its surface area, and so it separates from the uterine wall. This process can be illustrated by sticking a postage stamp to a piece of stretched elastic. When the elastic shrinks (contracts), the postage stamp peels off (retracts). As the uterus contracts downward from "chest to vagina," the placenta is forced in the direction of least resistance—toward the vagina. If the cord has not been clamped, this process is rapid and the placenta is expelled without resistance into the vagina. If the mother is squatting, it will be "delivered" by gravity.

The blood supplying the placenta runs within blood vessels, or "sinuses," which develop between groups of crisscrossing muscles during placental maturation. These sinuses close as the uterine wall contracts, and the blood vessels supplying the placenta are thus shut off. When the cord is left unclamped, pressure from uterine contractions maintains continuous blood flow from the uterus and placenta so that the blood going to the baby continues to be saturated with oxygen. Even as the placenta continues to function, its decreased blood volume causes it to shrink, separating quickly and easily, as the

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uterus rapidly closes off the blood vessels. (In the event that these blood vessels do not close off, care must be taken to treat maternal bleeding by removing the placenta—but not necessarily cutting the cord.)

When the cord is clamped before the placenta is delivered, however, the counterresistance from the unshrunken placenta can be great enough to impede complete retraction. Separation and expulsion are thereby impaired by the bulky and blood-laden placenta. A retained placenta prevents uterine muscles from closing off the blood vessels, and increases the risk of maternal blood loss. *Studies have shown that immediate cord clamping prolongs the average duration of the third stage and greatly increases maternal blood loss.*[4]

Retraction of the placenta, which quickens separation and expulsion and reduces blood loss, can only be achieved naturally, by allowing the cord to remain unclamped—or, in cases where the cord must be cut, by leaving the placental end unclamped. Maintaining this continuous blood flow to the baby reduces placental blood volume, and therefore reduces uterine contents, by approximately 90 mls of blood. As retraction occurs, contraction of the uterus squeezes more blood out of the placenta, further reducing its size and supplying the baby with this blood.

For mothers who are Rh-negative, this is especially important. Fewer Rh-negative mothers of Rh-positive babies develop antibodies when the cord is unclamped and separation of the placenta is spontaneous.[5] Normally, the placental barrier prevents mixing of maternal and fetal circulation. However, when the placenta separates *after* cord clamping, the baby's blood, which is still in the placenta, can mix with the mother's blood, causing maternal contamination.

The Effects of Cord Clamping on the Baby

Before birth, a baby's blood is distributed throughout his or her placenta and body. The blood in the baby *and in the placenta* rightfully belongs to the baby and should go with him or her at birth. Many health practitioners mistakenly think that the baby's body is already full of blood and that the placental blood is excess. The placental blood, however, serves an important purpose.

"Studies have shown that *immediate* cord clamping prolongs the average duration of the third stage and greatly increases maternal blood loss."

Prior to birth, the baby's lung alveoli are fluid-filled, and as such they keep the blood vessels of the lungs constricted, automatically impeding the flow of blood to the lungs. When a baby is passing through the birth canal, the pressure exerted all around his body forces the fluid up and out of his lungs so that by the time he is born, the major portion of his lungs is clear of fluid. At birth, the blood vessels of the lungs fill with blood and, within seconds, the baby starts to breathe. This increased need for pulmonary blood flow to breathe, combined with increased movement of the baby's arms and legs, provides ample use for the placental blood.

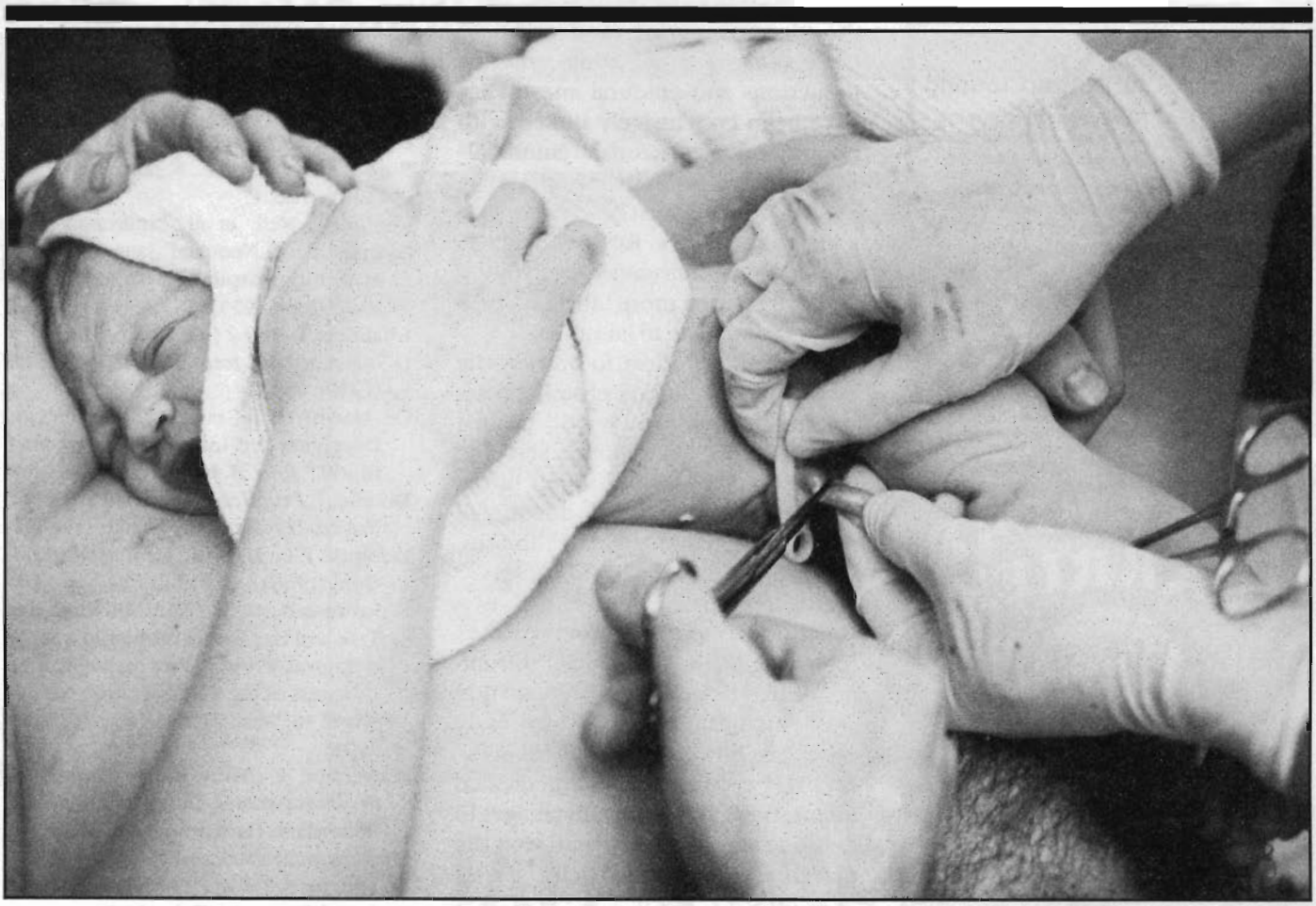
When the cord is clamped immediately, the baby attempts to breathe right away, without the aid of the oxygenated blood from the placenta. For premature babies, this can be particularly consequential. Several American reports suggest a tendency among hospital-born babies whose cords are immediately clamped to have poor circulation and bluish limbs. Could it be that they have simply not received their full quota of blood from the placenta? Could the reduced portion of blood volume available have gone toward the maintenance of major heart, lung, brain, and digestive functions at the expense of the circulatory system?

If a blood pressure gauge is placed on an unclamped umbilical cord, it will pick up pressure rises as high as 60 mm Hg (millimeters of ~~hemoglo-~~ mercury ~~bin~~) with each uterine contraction. This indicates that these contractions are intimately involved in the transfer of placental blood through the cord. A striking pressure rise, which persists through the first few hours of life, is also evident in the baby's vena cava and right atrium of the heart.[6] All studies on this indicate a significantly higher systemic pressure in infants who have been clamped late (90 percent in the first nine hours), and conversely a significant drop in pressure in early clamped infants (70 percent of systemic by the second hour, and almost 50 percent of systemic by the fourth hour).

Furthermore, three groups of researchers have independently reported that early clamped infants have a much higher incidence of cardiac murmurs during the first 14 days of life.[7] Granted, under certain circumstances, a baby's cord must be clamped immediately—for instance, when it is wrapped too tightly around the neck. However, under ordinary circumstances, it appears that an early clamped infant may not be operating at full potential.

While several researchers have documented the effects of early clamping on the baby's circulatory system, no one has studied the possibility of damage to the baby who has less oxygen-carrying capacity due to a reduction in red-blood-cell count.

Following are some of the published statistics, well documented in numerous studies, relating to the



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quantity of blood and the percentage of red blood cells in the cord and placenta.

- A baby's optimum blood volume is calculated at 85 mls per kg of body weight.[8]
- In full-term infants, placental transfusion increases the blood volume of the newborn baby by 40 to 60 percent. Such infants retain a 50 percent larger red-cell volume dispersed through a slightly enlarged blood volume, with higher hematocrit values than are found in infants whose umbilical cords are clamped immediately at birth.[9]

Other studies show:

- The placental blood normally belongs to the infant, and his or her failure to get this blood is equivalent to submitting the newborn to a severe hemorrhage at birth.[10]
- Deprivation of placental blood results in a relatively large loss of iron to the infant.[11]
- The time of cord clamping may be involved in the pathogenesis of idiopathic respiratory distress syndrome (the earlier clamped, the more respiratory distress).[12]
- Placental blood acts as a source of nourishment that protects infants against the breakdown of body protein.[13]

In essence, an infant who has had the cord clamped immediately has been subjected to the equivalent of a severe hemorrhage, deprived of a significant percentage of his or her blood volume and red cells, robbed of his or her rightful store of iron, placed at risk of some respiratory distress, and denied protection against the breakdown of body protein. *Is this baby in optimum condition?*

Cord Clamping and Hyperbilirubinemia

"If delayed cord clamping is adopted as a means to reduce the incidence of respiratory distress syndrome in premature births, there will be an accompanying augmentation of hyperbilirubinemia [jaundice] to deal with."[14] This increased incidence of jaundice among premature infants has been used as a primary argument against delayed cord clamping in full-term infants as well.

Low levels of bilirubin are part of the normal physiologic process in the newborn. At birth, the liver constitutes approximately 4 percent of the body weight and occupies a considerably larger portion of the abdominal cavity than it does later in life. It is the primary organ involved in bilirubin metabolism, 75 percent of which is derived from red blood cells. The iron produced by the breakdown of red blood cells is concentrated in the liver for release during the first year of life. The by-product of this breakdown, bilirubin, is what causes the characteristic yellowing of the skin seen with hyperbilirubinemia.

Whereas physiological jaundice is a naturally occurring process, nonphysiological jaundice requires special consideration and neonatal help.[15] Factors contributing to nonphysiological jaundice include premature birth and medications that have passed through

the placenta during (and prior to) labor. Among other drugs, pitocin inductions and epidural anesthetics have been conclusively linked with nonphysiological neonatal jaundice.[16] Actually, *any* drug administered to mother or baby must be viewed with a "jaundiced" eye, for it is likely to compete with bilirubin sites on blood protein, causing more bilirubin to be free to contribute to jaundice.

In an all-out effort to prevent the possibility of jaundice, obstetric practitioners have reasoned against delayed cord clamping, since it increases the volume of red blood cells—which, in breaking down, will produce increased levels of bilirubin. To prohibit the flow of this "excess" blood, obstetricians routinely intervene and clamp the cord immediately following birth. True, hyperbilirubinemia may be prevented in premature and "medicated" infants by early clamping; however, in a normal delivery of a full-term, unmedicated infant, there are untold advantages to delaying cord clamping until after the placenta has delivered itself.

This article appeared in another form in the New Zealand Association of Midwives newsletter.

Notes

1. Botha (See Bibliography).
2. Mauriceau: 189.
3. Donald: 292, 564.
4. Walsh.
5. Doolittle and Moritz.
6. Moss et al.
7. Buckel, Arcilla, Burnard, and James.
8. Benson.
9. Saigat et al.
10. De Marsh et al.
11. De Marsh et al.
12. Saigat et al.
13. De Marsh et al.
14. Saigat et al.
15. For information on the management of jaundice, see "Phototherapy," by Mary Ban Recla, in *Mothering* #29 and "Jaundice and Breastfeeding" by Lawrence M. Gartner and Kathleen Auerbach in this issue.
16. Swartz, Chalmers, and D'Souza.

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