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SECTION 2. RESEARCH PERSPECTIVES

Mother and Infant: Early Emotional Ties

Marshall Klaus, MD

ABSTRACT. Recent behavioral and physiologic observations of infants and mothers have shown them ready to begin interacting in the first minutes of life. Included among these findings are the newborn infant's ability to crawl toward the breast to initiate suckling and mother-infant thermoregulation. The attachment felt between mother and infant may be biochemically modulated through oxytocin; encouraging attachment through early contact, suckling, and rooming-in has been shown to reduce abandonment. *Pediatrics* 1998;102:1244-1246; *emotional development, mother-infant attachment, bonding, oxytocin, breast crawl, breastfeed, baby-friendly initiative.*

In the past 10 years, several provocative behavioral and physiologic observations in both infants and mothers have altered our perception of their readiness to begin interacting in the first minutes of life. In addition, two simple interventions for mothers and their infants in the perinatal period have led to new insights into their relationship at the time of birth.

This report describes and integrates these new findings and observations and discusses how they will alter current caregiving practices in the perinatal period and their implications for additional research.

THE BREAST CRAWL

The most visually striking observation of the first minutes of life is the ability of a newborn, if left quietly on the mother's abdomen after birth, to crawl up to her breast, find the nipple, and begin to suckle.¹ If the infant is dried thoroughly and placed on her abdomen and not taken from the mother for the next 60 minutes, the infant begins a five-part sequence. For the first 30 minutes, the newborn rests and looks at his mother intermittently. Between 30 and 40 minutes, lip-smacking and mouthing of the fingers begin, followed by an outpouring of saliva onto the infant's chin. Then the infant begins to inch forward with his legs to push strongly into the mother's lower abdomen. When he reaches the tip of the sternum, he bounces his head into her chest. While moving up, he often turns his head from side to side. As he comes close to the nipple, he opens his mouth widely and, after several attempts, makes a perfect placement on the areola of the nipple.

The odor of the nipple appears to guide the journey. If the right breast is washed with soap and

water, the infant will crawl to the left breast and vice versa.² If both breasts are washed, the infant will move to the nipple that is painted with the amniotic fluid of the mother. This trip was made by 15 of 16 infants from a group of mothers who did not receive pain medication and whose infants were not taken away, bathed, and given vitamin K or eye ointment (Fig 1).³ For newborns not making the crawl on their own, when placed between the breasts, there also is usually a delay of 30 to 40 minutes before he moves toward the nipple. The infant reaches the target just as effectively, but with a different pattern of behavior. Instead of beginning to suckle, many infants just lick the nipple and their hands. These observations should be taken into consideration in institutions in which standard maternity policy is to attempt to place infants on the breast immediately after birth.

THERMOREGULATION

A perfect complement to the infant's ability to crawl to the breast is the mother's capacity to keep him warm on the journey. A mother can maintain her infant's body temperature as successfully as elaborate, high-technology heating devices when her nude, dry infant is placed skin-to-skin on her chest.⁴ In addition, this skin-to-skin contact has a calming and reassuring effect on the infant. For the first 90 minutes after birth, infants held skin-to-skin on their mother's chests hardly cried at all compared with infants who were placed in bassinets after being dried and wrapped in blankets⁵ (Fig 2).

THE BABY-FRIENDLY INITIATIVE

In bringing a common context to these new observations, it is necessary to note that many studies have revealed that a mother will breastfeed more successfully and for longer periods of time when she is permitted to have early contact, an opportunity for suckling in the first hour, and rooming-in with her infant. In 1990, to increase breastfeeding throughout the world, UNICEF incorporated these interventions into a 10-point program called "The Baby-friendly Initiative." Other elements of the Initiative included a breast-feeding plan for the hospital, the absence of bottles and pacifiers, and closure of the newborn nursery. With UNICEF's encouragement, >50% of births in some countries now occur in "baby-friendly" maternity hospitals.

This large-scale change in care has been accompanied by an unexpected positive observation in several countries. In places where a disturbing number

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Fig 1. An infant boy <1 hour old crawls up his mother's body and latches onto her breast by himself, clockwise from left. (Photograph courtesy of Marshall Klaus and Linnart Righard.)

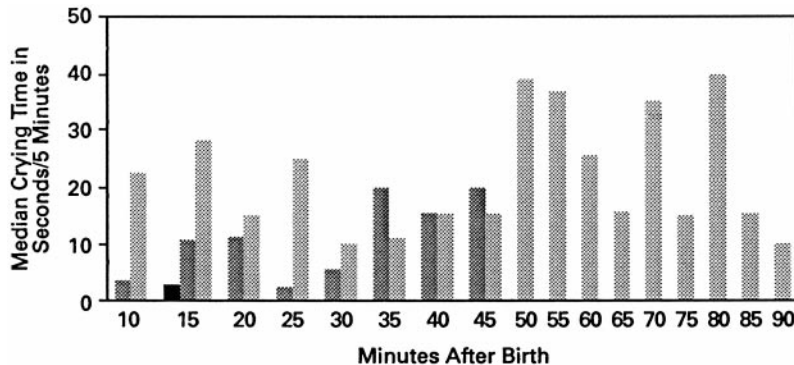


Fig 2. Separation distress call of the human neonate in the absence of maternal contact. Crying time in seconds for infants skin-to-skin on their mother's chests for a full 90 minutes (solid square); infants in cots for 45 minutes, and then skin-to-skin on their mother's chests for 45 minutes [dark gray square]; infants in cots for 9 minutes. (Adapted from Christensson K et al. *Acta Paediatrica*. 1995;84:468-473.)

of infants had been abandoned by their mothers in the maternity hospital, the introduction of early contact with suckling and continuous rooming-in has reduced significantly the frequency of this sad outcome. For example, a hospital in Thailand reported a drop in abandonment from 33 per 10 000 to 1 per 10 000 births after becoming "baby friendly."⁶ In one maternity hospital in St. Petersburg, Russia, abandonment was initially 5.5 to 6 per 1000 births during 1990-1992; the rate dropped to 3 per 1000 births within the next 3 years after adopting the Baby-friendly Initiative. Similar observations have been made in the Philippines and in Costa Rica.

In my observations in 11 hospitals in the Philippines, mothers were feeding their infants every 45 to 75 minutes throughout their waking hours. This was possible because in a baby-friendly hospital, the newborn infant frequently is left in the mother's bed

during the entire maternity stay. Is this reduced abandonment the result of early or increased mother-infant contact, the increased sucking stimulation, or both?

Several reports address this issue. First, O'Connor and colleagues performed a randomized trial of 277 mothers in a hospital with a high incidence of parenting disorders.⁷ On the first 2 days of life, one group saw their infants for 20 minutes every 4 hours (the usual and customary time); the experimental group had their infants with them for a similar time plus an additional 6 hours daily. Ten children in the control group and 2 in the experimental group experienced abuse, failure to thrive, abandonment, or neglect in the next 17 months of life. A similar study in North Carolina of 202 mothers and infants during the first year of life found 10 cases of failure to thrive, neglect, or abuse in the control group, compared with 7 in the group that had extended contact.⁸ When

the results of these two studies are combined in a meta-analysis, the statistical probability (P) that additional mother–infant contact in the first days of life reduces later abuse and neglect is $>.054$.

The Role of Oxytocin

Suckling in the first hours of life also may contribute to reduced abandonment. Swedish researchers noted that if an infant's lips touched her mother's nipple in the first hour of life, the mother kept her infant 100 minutes longer every day than mothers who did not experience suckling until later.⁹ It should be noted that when the infant suckles from the breast, there is an outpouring of 19 different gastrointestinal hormones in both the mother and the infant, including insulin, cholestykinin, and gastrin. Five of these hormones stimulate the growth of intestinal villi in the mother and the infant. As a result, with each feeding, there is an increased intestinal surface area for nutrient absorption. The hormonal release is stimulated by the touch of the mother's nipple by her infant's lips. This increases oxytocin in both the mother's brain and the infant's brain, which stimulates the vagus nerve, then causes the increase in the output of gastrointestinal hormones. Before the development of modern agriculture and grain storage 10 000 years ago, these responses in the infant and mother were essential for survival when famine was common.¹⁰

Only small amounts of oxytocin reach the brain via the bloodstream, because the blood–brain barrier is essentially impermeable to the hormone. Within the brain, oxytocin receptors are supplied by endogenous production. The increase of brain oxytocin in the mother results in slight sleepiness, euphoria, a higher pain threshold, and increased love for the infant. High plasma oxytocin concentrations also are associated with sleepiness, suggesting that during breastfeeding, higher blood levels are associated with increased brain levels.

Plasma oxytocin was found to be elevated following birth in women who held their infants skin-to-skin; notably the oxytocin peaked after expulsion of the placenta.¹¹ After one or two suckling periods, the blood oxytocin became elevated with each breastfeeding. These increased levels may enhance the bonding of the mother to her infant as well as contract the uterine muscle to prevent bleeding. Do these findings help explain the observation made by nurses in France in the 19th century, when many poor women were giving up their infants? They noted that mothers who breastfed for at least 8 days rarely gave up their infants.

LABOR SUPPORT

A meta-analysis of 11 randomized trials reported that continuous support during labor by an experienced woman (known as a doula) reduced significantly the length of labor, the need for pain medications, operative vaginal delivery, and in many cases the number of cesarean sections.¹² In 1 of the 11 studies, impressive behavioral differences were observed 6 weeks' postpartum, wherein a significantly greater proportion of women in the doula group were breastfeeding than in the control group (51% vs 29%).¹³ These mothers took an average of 2.9 days to develop relationships

with their infants, compared with 9.8 days in the control group. At 6 weeks, they were significantly less anxious, had scores on a depression test significantly lower than those in the control group, and had higher levels of self-esteem. The supported mothers often rated their infants as "better" than standard infants, more beautiful, clever, and strong. In contrast, the control group mothers rated their infants as being almost as beautiful, clever, and strong as standard infants. This suggests that the care a mother receives in labor may determine, in part, the way she cares for her infant.

RECOMMENDATIONS FOR THE FUTURE

Most needed in the future are additional studies to confirm that continuous social support in labor also improves the psychological health of the mother and has parenting benefits such as reducing the incidence of child abuse. Additional studies also are needed to explore the effect of baby-friendly initiatives in altering later maternal behavior.

APPLICATIONS TO PRACTICE

These findings suggest that care provided in the perinatal period must be reviewed thoroughly. All parents of healthy infants should be offered early contact and the opportunity to get to know their infants before bathing and the administration of vitamin K and eye ointment. In addition, breastfeeding and rooming-in should be encouraged for all mothers during the short (48-hour) hospital stay. Furthermore, because continuous labor support is associated with improved obstetric outcomes and parental involvement, it is time that no mother labors alone without continuous support by a skilled woman.

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