

Effect of Labor Epidural Anesthesia on Breast-feeding of Healthy Full-term Newborns Delivered Vaginally

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Background: Epidural anesthesia is commonly administered to laboring women. Some studies have suggested that epidural anesthesia might inhibit breast-feeding. This study explores the association between labor epidural anesthesia and early breast-feeding success.

Methods: Standardized records of mother-baby dyads representing 115 consecutive healthy, full-term, breast-feeding newborns delivered vaginally of mothers receiving epidural anesthesia were analyzed and compared with 116 newborns not exposed to maternal epidural anesthesia. Primary outcome was two successful breast-feeding encounters by 24 hours of age, as defined by a LATCH breast-feeding assessment score of 7 or more of 10 and a latch score of 2/2. Means were compared with the Kruskal-Wallis test. Categorical data were compared using the Mantel-Haenszel chi-square test. Stratified analysis of potentially confounding variables was performed using Mantel-Haenszel weighted odd ratios (OR) and chi-square for evaluation of interaction.

Results: Both epidural and nonepidural anesthesia groups were similar except maternal nulliparity was more common in the epidural anesthesia group. Two successful breast-feedings within 24 hours of age were achieved by 69.6% of mother-baby units that had had epidural anesthesia compared with 81.0% of mother-baby units that had not (odds ratio [OR] 0.53, $P = .04$). These relations remained after stratification (weighted odds ratios in parenthesis) based on maternal age (0.52), parity (0.58), narcotics use in labor (0.49), and first breast-feeding within 1 hour (0.49). Babies of mothers who had had epidural anesthesia were significantly more likely to receive a bottle supplement while hospitalized (OR 2.63; $P < .001$) despite mothers exposed to epidural anesthesia showing a trend toward being more likely to attempt breast-feeding in the 1 hour (OR 1.66; $P = .06$). Mothers who had epidural anesthesia and who did not breast-feed within 1 hour were at high risk for having their babies receive bottle supplementation (OR 6.27).

Conclusions: Labor epidural anesthesia had a negative impact on breast-feeding in the first 24 hours of life even though it did not inhibit the percentage of breast-feeding attempts in the first hour. Further studies are needed to elucidate the exact nature of this association. (J Am Board Fam Pract 2003;16:7-13.)

Breast milk is considered the optimum source of nutrition for infants, and *Healthy People 2010* expresses a goal of increasing the proportion of breast-feeding mothers from 64% (1998) to 75% by 2010.¹ The numerous infant benefits of breast-feeding include reducing allergic manifestations, sudden infant death syndrome, and infections, such as gastroenteritis, otitis media, respiratory tract in-

fections, and others.^{1,2} A variety of hospital routines appear to promote breast-feeding success, including education, extensive rooming-in, and withholding formula gift packs or coupons.^{2,3} The importance of early placement of the infant to breast is less clear,² perhaps because study hospitals have high rates of early suckling.³ Similarly, use of supplemental formula in the nursery is believed to inhibit breast-feeding success.² A strong negative association with early formula supplementation and breast-feeding at 1 and 4 months was found by bivariate analysis in one study of 394 women, with borderline significance ($P < .6$) found with multivariate analysis.³ The breast-feeding rate of mothers at 20 weeks' postpartum is significantly less if

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supplementation by formula occurs by the second postpartum week.⁴

Epidural anesthesia is commonly administered to laboring women planning to breast-feed. There is a perception among some medical personnel that epidural anesthesia might inhibit breast-feeding, perhaps because of reports of adverse effects of narcotic and epidural analgesia on certain infant neurobehavioral parameters.^{2,5,6} The current medical literature, however is insufficient to accept or reject this hypothesis.

Walker⁵ reviewed 13 articles that reported the effects of epidural analgesia on infant neurobehavioral outcomes as measured by scored structured neurobehavioral examinations. Only five studies included a control group, and only two of those five included infant assessments after 24 hours of age. The latter two studies^{7,8} found depressed motor abilities of babies whose mothers received epidural anesthesia. A dose effect was found for some of the measured parameters.⁸ The remainder of the studies in Walker's review showed conflicting results of neurobehavioral tests in newborns exposed to epidural anesthesia; none of the reviewed studies examined breast-feeding as a specific outcome.⁵

The 1974 study of Scanlon et al⁹ compared neurobehavioral testing in the first 8 hours of life of 28 babies exposed to epidural anesthesia and 13 babies not exposed to epidural anesthesia. The epidural anesthesia group had lower scores on muscle strength and tone and rooting, but not sucking. A 1989 Finnish study examined the effects of maternal lumbar epidural anesthesia on neonatal neurobehavioral response at ages 3 hours, 1 day, 2 days, and 4 to 5 days in healthy neonates born vaginally at term to 15 mothers who had epidural anesthesia during labor and compared the outcomes with those of babies born to 19 mothers who did not have anesthesia. Babies who were born to mothers receiving epidural anesthesia scored significantly better on alertness at ages 3 hours, 2 days, and 4 to 5 days and better on sucking at 3 hours.⁶

The effects of epidural anesthesia on neurologic parameters can vary from agent to agent,¹⁰ and can be due to direct effects of the medication on the infant or indirect effects on the neonate, delivery process, or infant-mother interaction.⁸ The effects can also be subtle but unmasked when studied in combination with other factors, such as labor length, parity, and ponderal index.¹¹

There are few studies specifically examining the effects on breast-feeding of epidural anesthesia used during labor. Video recordings were made of 28 newborns put to breast immediately after birth. Spontaneous breast-seeking and breast-feeding behaviors were reduced in the 18 babies exposed to a variety of analgesia types compared with 10 babies not exposed to analgesia. Only three patients who had had epidural anesthesia were included in this study.¹² Lie and Juul¹³ studied two groups of 28 mothers who underwent cesarean section and partially self-selected to receive either general or epidural anesthesia. Patients with epidural anesthesia had higher breast-feeding frequency and longer breast-feeding periods than those who had general anesthesia and were similar to a control group of 28 patients who were delivered vaginally. Labor epidural anesthesia was not studied.

Rosen and Lawrence¹⁴ found no effects of epidural anesthesia on weight loss or subjective reports of feeding behaviors before hospital discharge in 181 breast- and bottle-feeding newborns. Similarly, the study of 171 women by Halpern et al¹⁵ showed no early or late (6 to 8 weeks' postpartum) adverse effects on breast-feeding by the use of epidural anesthesia during labor. Women having cesarean sections were included and not segregated in either study.^{14,15} Albani et al¹⁶ found no adverse effects of intrapartum epidural anesthesia on breast-feeding rate among 1,914 women who were delivered vaginally.

A recent well-designed study by Riordan et al¹⁷ compared 37 women with no labor analgesia, 52 with intravenous analgesia, 27 with only epidural anesthesia, and 13 with both epidural and intravenous analgesia. Using a breast-feeding assessment tool that measures infant readiness, rooting, fixing, and suckling to measure early success, breast-feeding scores were similar and significantly lower for women who had intravenous and epidural-only analgesia compared with women who had no analgesia.

The purpose of our study was to examine specifically the effects of epidural anesthesia during labor on breast-feeding success and bottle supplementation, for the initial hospitalized newborn period, of healthy neonates born vaginally at term in a community hospital.

Methods

The study setting was the birthing center of our 714-bed urban, non-inner-city community medical

center, which had 1,556 births in calendar year 1999. A scheduled monthly rotation of our family practice residency program provided for continuous family practice resident coverage of the birthing center. These obstetric rotations did not include residents in obstetrics and gynecology. There were no changes in attending physician staff or arrivals or departures from the residency program during this period.

The study group consisted of mother-baby dyads comprising 115 healthy, full-term, breast-feeding newborns delivered vaginally and their mothers (aged 16 to 41 years with no complications) who received epidural anesthesia during labor, and 116 mother-baby dyads comprising newborns and their mothers who did not receive epidural anesthesia during labor. Power analysis (80% power, $P = .05$) indicated the need for 112 subjects in each group to detect a 15% difference in the primary outcome. Cases were all consecutive breast-feeding mothers who had had epidural anesthesia at our urban community hospital birthing center from 1 February 1999 to 30 June 1999; 22 were omitted because of incomplete outcome data. Controls were the next breast-feeding mothers who were delivered without epidural anesthesia after each case (10 were omitted for inadequate data, 11 for complications of the mother or baby). Patients omitted for inadequate data did not differ from their respective group using the demographic and perinatal parameters that are displayed in Table 1.

During the study period 648 babies were born to 639 mothers. There were 512 vaginal deliveries, with a labor epidural placement rate of 47%. Of the 512 vaginal deliveries, 443 resulted in uncomplicated mother-baby dyads. The breast-feeding initiation rate for all babies, including those born by cesarean section, was 62%. Thus of the 276 estimated healthy breast-feeding mother-baby dyads, 263 (95%) were entered into the study, with 32 omitted for incomplete data.

The primary outcome was two successful breast-feeding encounters by 24 hours of age, as defined by a LATCH¹⁸ breast-feeding assessment score of 7 or more of 10 and a latch score of 2/2. The LATCH breast-feeding assessment scoring system awards 0 to 2 points on five items (latch, audible swallow, type of nipple, comfort, and hold). Two points on the latch portion of this scoring system are given for nose or chin to breast, tongue down or forward, lips flanged; 1 point for repeated attempts,

Table 1. Comparison of Breast-feeding Groups.

Characteristics	Epidural Anesthesia (n = 115)	No Epidural Anesthesia (n = 116)
Mean maternal age, y	29	27
Nulliparity, %	49*	34*
White race, %	95	96
Maternal length of stay, d	2.0	1.9
Infant female, %	50	50
Mean gestational age, wk	39	39
Mean birth weight, g	3,490	3,500
Mean Apgar score—1 min	8.2	8.2
Mean Apgar score—5 min	8.9	8.9
Infant umbilical arterial, pH	7.27 [†]	7.28 [‡]
Meconium, %	11	16
Infant length of stay, d	2.0	2.0
Infant positive Coombs test, %	11	10
Infant void within 24 hours, %	90	94

* $P = .02$, Mantel-Haenszel chi-square test.

[†]n = 87.

[‡]n = 70.

holds nipple in mouth; and 0 points for too sleepy or disinterested, no latch achieved.

Before initiation of this study, the birthing center instituted a computerized clinical pathway data form for newborns of mothers having uncomplicated vaginal deliveries. These forms mandated uniform and systematic collection of a variety of clinical parameters as well as breast-feeding data, including the LATCH scoring systems. These pathway forms were completed by the nurses. If key patient outcomes for the mother or baby were not achieved, the patients fell off the pathway. Hence, there was a system to ensure that patients with complications were not included in the study.

In addition, before initiation of the study, the birthing center staff were given in-service education by one of the authors (BP) concerning the investigation and factual information regarding the lack of definitive literature confirming or refuting adverse effects of epidural anesthesia on breast-feeding. This educational component was an attempt to minimize bias of the mothers regarding anesthesia choices. No attempts were made to influence physician choice of anesthesia.

Analysis was by Epi-Info statistical software. Means were compared with Kruskal-Wallis test. Categorical data were compared using the Mantel-Haenszel chi-square test. Crude odds ratios were constructed for primary and secondary outcomes.

Table 2. Effect of Labor Epidural Anesthesia on Breast-feeding.

Outcomes	Odds Ratio	*95% CI	P Value [†]
Primary outcome			
Two breast-feedings within 24 h (total LATCH score = 7, latch score = 2/2)	0.53	0.28–1.03	.044
Secondary outcomes			
Two breast-feedings within 24 h (total LATCH score = 7)	0.49	0.21–1.11	.060
Two breast-feedings within 24 h (latch score = 2/2)	0.53	0.28–1.03	.044
Bottle supplement during stay	2.63	1.43–4.85	<.001
Bottle supplement before two breast-feedings (latch score = 2/2)	2.17	1.00–4.74	.031
Bottle supplement within 24 h	2.55	1.26–5.18	.004
First breast-feeding attempt within 1 h	1.66	0.93–2.97	.064

*Cornfield's method 95% confidence interval.

[†]Mantel-Haenszel chi-square test.

Stratified analysis of potentially confounding variables was performed using Mantel-Haenszel weighted odds ratios and chi-square for evaluation of interaction.

Results

Epidural and nonepidural anesthesia groups were similar regarding maternal age, race, and length of stay. Nulliparity was more common in the epidural anesthesia group ($P = .02$). The two groups were similar on a variety of infant parameters (Table 1).

Two successful breast-feedings within 24 hours of age were achieved by 69.6% of mother-baby units who had epidural anesthesia compared with 81.0% of those who did not (crude odds ratio [OR] 0.53; $P = .04$, Table 2). These relations remained or were strengthened, after stratification (weighted odds ratios) based on maternal age (OR = 0.52, CI = 0.28–0.97), parity (OR = 0.58, CI = 0.31–1.08), narcotics use in labor (OR = 0.49, CI = 0.26–0.91) and first breast-feeding within 1-hour (OR = 0.49, CI = 0.26–0.91). Overall, there was borderline statistical significance of our primary outcome results. Statistical significance was indicated by the Mantel-Haenszel chi-square test ($P = .04$), but not technically achieved by 95% Cornfield's confidence intervals (CI = 0.28–1.03). Approximations inherent in both of these methodologies resulted in technical, but not substantive, differences in statistical significance.

Infants exposed to epidural anesthesia were significantly more likely to receive a bottle supplement while hospitalized (OR = 2.63 [1.43–4.85];

$P < .001$), including stratification based on parity (2.55 [1.44–4.54]; $P = .002$), age ($P < .001$), narcotics ($P < .001$), and early breast-feeding ($P < .001$), despite epidural-exposed mothers showing a trend toward being more likely to attempt breast-feeding in the first hour (OR = 1.66; $P = .06$). Mothers who had epidural anesthesia and who did not breast-feed within 1 hour were at high risk for their babies receiving bottle supplementation (OR = 6.27).

Variables sought but not analyzed because of an incomplete database or few numbers included epidural medication type or dosage, maternal fluid balance, length of labor, socioeconomic status, use of local anesthesia, use of postpartum analgesics, and infant defecation. Within the epidural anesthesia group, the odds of successful breast-feeding appeared to increase modestly with duration of epidural anesthesia in labor (Table 3).

Discussion

This study found a negative association of maternal use of epidural analgesia during labor and early breast-feeding success as defined by a standardized breast-feeding assessment scoring system. It also found a strong association between epidural anesthesia use and bottle supplementation of the baby. These associations were not explained by mothers who had epidural anesthesia as being less likely to initiate breast-feeding in the first hour. In fact, our data showed a trend toward a positive association between epidural anesthesia use and breast-feeding encounters within the first hour. Bottle supplement-

Table 3. Effect of Timing of Epidural Anesthesia on Breast-feeding.

Outcome	Epidural Within 2 Hours of Birth			Epidural Within 4 Hours of Birth			Epidural Within 6 Hours of Birth		
	OR	P Value*	95% CI†	OR	P Value*	95% CI†	OR	P Value*	95% CI†
Two breast-feedings within 24 h (total LATCH score = 7, latch score = 2/2)	0.86	.754	0.30–2.52	0.91	.815	0.38–2.19	1.26	.611	0.46–3.41
Two breast-feedings within 24 h (total LATCH score = 7)	0.88	.779	0.26–3.19	1.14	.784	0.40–3.21	1.48	.446	0.47–4.59

OR—odds ration, CI—confidence interval.

*Mantel-Haenszel chi-square test.

†Cornfield's method 95% confidence interval.

tation, however, was particularly likely to occur with dyads who were exposed to epidural anesthesia and not having an immediate breast-feeding encounter. The study design did not allow for exploration of why dyads exposed to epidural anesthesia had a higher likelihood of breast-feeding within the first hour. One possible explanation is that mothers who received epidural anesthesia might have been more comfortable immediately after birth and therefore more able to attempt breast-feeding.

Our study differs from those in the literature by being reasonably powered and restricted to mothers and their healthy, full-term babies delivered vaginally, comparing early breast-feeding success parameters directly. Other studies compared neurobehavioral changes in dyads exposed or not exposed to epidural anesthesia. The study by Lie and Juul¹³ examined breast-feeding parameters but was restricted to cesarean births, and those of Rosen and Lawrence¹⁴ and Halpern et al¹⁵ contained unsegregated mixtures of vaginal and cesarean births. The studies of infant neurobehavioral effects associated with epidural anesthesia exposure did not include assessment of breast-feeding parameters using a standardized tool.^{5,9} Perhaps the optimum study would be to use both neurobehavioral and breast-feeding success measurements.

The explanation for the negative effects of epidural anesthesia during labor on breast-feeding in this study is unclear. If, indeed, epidural exposure causes transient neuromotor impairment of the infant and affects breast-feeding skills,^{5,9} these impairments might lead to inadequate breast-feeding interactions. Poor breast-feeding encounters might, in turn, prompt parents or nursery personnel to offer the baby formula by bottle.

One might suggest that women choosing epidural anesthesia did so because of actual or anticipated longer, more difficult labors. Our study was unable to collect data on labor length or difficulty. Total maternal length of stay, however, did not differ between the epidural anesthesia and control groups. Nor were there differences in infant parameters, which might reflect labor stress or hypoxemia, such as Apgar scores, umbilical artery pH, meconium passage, and infant length of stay. Any major maternal or infant complication, however, resulted in the dyad not being included in either group in this study.

Although duration of labor epidural anesthesia might not be an appropriate proxy for labor duration, in our study increasing length of epidural anesthesia administration was not associated with decreasing breast-feeding success. Our data did not allow for exploration of the possibility that longer epidural anesthesia use reflected planned use of epidural anesthesia earlier in labor and a more comfortable complete active phase compared with a shorter duration of epidural anesthesia, perhaps because of more exhausting or painful active labor phases. A more comfortable total labor experience, albeit with longer epidural exposure, might result in a mother more able to successfully breast-feed.

Nulliparity was more common in our group exposed to epidural anesthesia. In a study of 1,488 women administered prenatal and postpartum questionnaires, increased parity negatively affected breast-feeding initiation, but past breast-feeding had a positive and stronger effect.¹⁹ In our study, when stratified by parity, breast-feeding success remained less for infants exposed to epidural anesthesia (OR = 0.58 for primary outcome), although the significance was not as great (95% CI = 0.31–

1.08). Bottle supplementation in the group exposed to epidural anesthesia remained significantly higher when stratified by parity.

The Sepkoski et al study of 20 mothers exposed to epidural anesthesia and 20 mothers not exposed to epidural anesthesia⁸ found that significantly less time was spent with baby in the hospital by the mothers exposed to epidural anesthesia. The dose of bupivacaine in the epidural anesthesia was a predictor of diminished mother-baby time and of diminished performance of exposed infants on mean orientation and motor cluster scores on the Neonatal Behavioral Assessment Scale. Another study, however, found that mother-baby time together in the first 48 hours after birth was not associated with the proportion still breast-feeding at 6 months,²⁰ but it did not examine early breast-feeding effects of mother-baby time together. Our study did not include assessments of mother-baby time while in the hospital as a possible explanation for negative breast-feeding effects of epidurals.

An additional unexplored explanation for the apparent negative effects of epidural exposure on early breast-feeding success is that mothers willing to accept one intervention (epidural) are more willing to accept another (bottle supplementation). We speculate that the explanation for our findings might be multifactorial, similar to the concept proposed by Lester et al.¹¹ Perhaps mild neurobehavioral effects of epidural anesthesia, in concert with real or perceived labor difficulties, result in a suboptimum early breast-feeding interaction involving mothers already relatively more accepting of interventions; hence, bottle supplementation and further breast-feeding difficulties result.

In conclusion, we found epidural anesthesia during labor is negatively associated with early breast-feeding success despite not inhibiting early breast-feeding attempts. Limitations of our study include lack of information regarding length and difficulty of labor, fluid balance, mother-baby time together, and medication type and dosage. We also did not include long-term follow-up (which showed a negative association of epidural anesthesia and breast-feeding rate at 6 months in one study,²⁰ and negative effects of maternal work in another¹⁹). Further studies are needed to clarify the relation between epidural anesthesia and breast-feeding. Optimal studies would be well-powered investigations that include epidural medication, duration and dosages, precise control of other medications,

data on duration and difficulty of labor, and breast-feeding success measurements, as well as infant neurobehavioral testing, assessment of mother-baby time, and long-term follow-up.

John C. Rogers, MD, proposed the problem, and Esmeralda Santana prepared the manuscript.

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