

The Effect of Epidural Anesthesia on the Length of Labor

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Background. Epidural anesthesia, although effective, has been associated with changing the course of labor. Previous studies have been criticized for not pinpointing the factors determining the use of epidural anesthesia. The purpose of this study was to determine the effect of epidural anesthesia use on the course of labor.

Methods. A retrospective chart review of 224 women who gave birth from July 1, 1993, to June 30, 1994, was completed in a small-town family practice. The time frame included 6 months before and after the initiation of TennCare, a state-funded health insurance plan designed to serve the uninsured and those previously served by Medicaid in Tennessee.

Results. The rate of epidural anesthesia use in this study population fell sharply after January 1, 1994, the start date for TennCare. Epidural anesthesia by women in this study was found to increase the average length of the second stage of labor by 38 minutes for primiparas and 23 minutes for multiparas.

Conclusions. The average length of the second stage of labor is significantly longer for women who receive epidural anesthesia. The rate of epidural anesthesia use in this study population was strongly influenced by a change in health-care financing.

Key words. Anesthesia, labor stage, second; insurance, health, reimbursement. (*J Fam Pract* 1995; 40:244-247)

Epidural anesthesia is a common choice of analgesia during both the first and second stages of labor. Although considered safe, it affects the course, speed, and consequences of labor. Several European and Canadian studies have shown that the use of epidural anesthesia can lengthen the second stage of labor.¹⁻⁶ In one study of nulliparous women, the average length of the second stage of labor was more than 1 hour longer among women receiving epidural, compared with those who received narcotic, analgesia.² Criticisms of these studies have suggested, however, that the epidural analgesia rate is confounded by the particular physician's or hospital's standard of care or the patient's inherent need for epidural anesthesia.⁷ These evaluations have suggested that women who have cephalopelvic disproportion, and thus long labors, are the ones most likely to need epidural anesthesia and subsequently to require forceps delivery or cesarean section.^{8,9} These studies have been criticized for

the lack of comparability among the populations studied and, therefore, the inability to isolate epidural anesthesia use as the cause of observed differences in labor.^{7,10,11}

The introduction on January 1, 1994, of TennCare, a state-funded health care insurance plan designed to serve uninsured and Medicaid patients in Tennessee, caused an immediate and significant decrease in the epidural anesthesia rate among the population of this study. Ninety-five percent of all these patients were immediately covered by TennCare insurance. A patient's type of insurance coverage (TennCare, Virginia Medicaid, or private) had a significant impact on whether she received epidural anesthesia during labor. There were no other changes in physician care, nursing staff, hospital, physicians involved, or demographics of the population. The purpose of this study was to examine the effect of epidural anesthesia on the length of labor.

Methods

The labor and delivery records of all patients who gave birth from July 1, 1993, to June 30, 1994, and who were in the care of the residents and faculty of the Bristol

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Table. Number and Percentage of Women Who Were Given Epidural Anesthesia During Labor in the 6 Months Before and After the Inception of TennCare, a New State-Funded Health Insurance Plan

Parity	No. (%) of Patients Given Epidural*		Length of Second Stage of Labor (min)†	
	6 Months Before Insurance Coverage	6 Months After Insurance Coverage	With Epidural Anesthesia	Without Epidural Anesthesia
	Primipara	38 (80)	14 (33)	84
Multipara	30 (63)	9 (20)	40	17
All patients	68 (71)	23 (27)	N/A	N/A

*Difference in epidural anesthesia use before TennCare and after TennCare: $\chi^2=19.2$, $P<.001$ for primiparas; $\chi^2=15.52$, $P<.001$ for multiparas.

†Difference between the length of the second stage of labor in minutes using epidural and not using epidural: $t=2.939$, $P=.004$ for primiparas; $t=4.868$, $P<.001$ for multiparas.

Note: Percentages may vary by $\pm 1\%$ because of rounding.

Family Practice Residency were examined retrospectively. Demographic and labor and delivery data were recorded, including date of delivery, maternal age, parity, gestational age, race, insurance, type of anesthesia, type of delivery, birthweight, and length of the second stage of labor.

In January 1994, the State of Tennessee initiated a new health insurance system called TennCare. After January 1, 1994, most TennCare patients did not routinely receive epidural anesthesia for childbirth.

Of 224 women who gave birth during the year of this study, 38 had cesarean sections for reasons such as previous section, maternal genital herpes, primigravida breech, cephalopelvic disproportion, and fetal distress; these women were excluded from the study. Six precipitate deliveries were also excluded because the length of the second stage of labor could not be determined. After these exclusions, 180 women were eligible for the study. There were no maternal or fetal intrapartum deaths.

Statistical significance was determined by chi-square analysis and t test.

Results

Of the 224 women who gave birth during the year of the study, 98% were white and 2% were African American; 20% were under the age of 20 years, 66% were aged 20 to 29, and 14% were older than 29 years.

There were expected differences in age by parity: 35% of the primiparous women were under 20 years of age, 57% were aged 20 to 29, and 8% were over the age of 30 years. Only 8% of the multiparous women were younger than 20 years; 72% were aged 20 to 29, and 20% were over the age of 30 years.

In the first half of the study year, 67% of the women were insured by Tennessee Medicaid, 26% by Virginia Medicaid, 3% by private insurance, and 4% had no insur-

ance. In the second half of the study year, 53% were covered by Tennessee TennCare, 32% by Virginia Medicaid, 10% by private insurance, and 5% had no insurance.

Thirty-eight women gave birth by cesarean section, and 186 women had vaginal deliveries. Six of the vaginal births were excluded from the calculation because they were precipitate deliveries for which the second stage of labor could not be determined. The remaining 180 women were equally divided between primiparous and multiparous. During the first half of the study year, 96 women gave birth vaginally and 20 had cesarean sections; in the second half of the study year, 84 had vaginal births and 19 had cesarean sections. Percentages of primiparous and multiparous women were similar in both halves of the year.

The rate of epidural anesthesia fell sharply from the first half of the second half of the study year: from 80% to 33% for primiparous women, from 63% to 20% for multiparous women; and from 71% to 27% for the total group of women. In the second half of the year, multiparous and primiparous women were both significantly less likely to receive epidural anesthesia during labor (Table).

The length of second-stage labor was significantly related to epidural anesthesia use. For primiparas, the average length of the second stage was 84 minutes with an epidural and 46 minutes without it, a difference of 38 minutes. For multiparas, the average length of the second stage was 40 minutes with an epidural and 17 minutes without it, a difference of 23 minutes (Table).

There were relatively few large-for-gestational-age (LGA) babies (over 4000 g). Seven (8%) LGA babies were born to primigravidas and six (7.5%) LGA babies were born to multiparous mothers. There were eight LGA babies born to mothers who had had epidural anesthesia (five to primigravidas, three to multigravidas) and five to mothers who did not have epidural anesthesia (two to primigravidas, three to multigravidas). There were no sig-

nificant differences in epidural anesthesia rates among the mothers of children born weighing over 4000 g as compared with those weighing between 3000 and 4000 g.

There was a slight decrease in the number of cesarean sections during the second 6 months of the study (24% to 18%). There were 14 forceps vaginal deliveries in the first 6 months and one in the second 6 months. Decreased use of epidural anesthesia may have been one factor in the decreased incidence of cesarean section and forceps deliveries. However, the small number of cesarean section deliveries and operative vaginal deliveries precluded analysis.

Discussion

The second stage of labor is influenced by use of epidural anesthesia, the size of the baby, the mother's parity, and the vertex's station at the end of the first stage of labor.² Epidural anesthesia is a common choice for anesthesia during labor. Although European studies have investigated the changes epidural anesthesia cause during labor, discussion of these effects in the United States often draw skepticism, if not outright disbelief.^{10,11} One European study of nulliparous women found that those receiving epidural anesthesia had a "significant prolongation" of first- and second-stage labor and an increased rate of cesarean section.² This lengthening of labor was suggested as the cause of the increase in cesarean sections among women who used epidural anesthesia.² A study in the United States showed that women receiving epidural anesthesia had a significantly longer mean duration of the second stage of labor.¹² A recent meta-analysis of 230 studies strongly supports the suggestion that epidural analgesia is linked to an increase in cesarean section rates of at least 10 percentage points.¹³

Why is this important? First, there are the obvious concerns about comfort and acceptance and tolerance of a shorter course of labor. Second, epidural anesthesia and long labors may be deleterious to the mother and possibly to the infant. One study of over 25,000 women in England showed that prolonged second stages of labor were associated with an increased incidence of postpartum hemorrhage and infection, possibly caused by an increased risk of operative deliveries.¹ Other studies have demonstrated that women who use epidural anesthesia during labor have a higher rate of operative deliveries, malposition, cesarean section for dystocia or cephalopelvic disproportion, and a need for pitocin augmentation.^{14,15} Operative vaginal deliveries and cesarean sections increase maternal morbidity, especially the incidence of postpartum hemorrhage, mortality, cost,

days in hospital, days off work, and total days of discomfort.

This study was not designed to show that prolongation of labor harms the mother or child or causes an increase in the operative delivery rate; nor does it address the acceptability of operative deliveries, or the acceptability of long, often less painful labors as compared with shorter, sometimes more painful labors. Previous larger studies, however, have linked epidural anesthesia use with longer labors, increased use of operative deliveries, and possibly increased inconvenience and pain.

Some studies have shown that a prolonged second stage has no deleterious effects on the infant,^{1,11} whereas others state that a prolonged second stage of labor is associated with increased perinatal morbidity.³ Epidural analgesia alone was associated independently with increased perinatal morbidity in one study.³

Criticism of existing studies centers on the lack of comparability between patient populations who do receive epidural anesthesia and those who do not, or between the providers of care for these two groups.^{10,11} For example, in some studies, the rate of epidural anesthesia use may have been influenced by the opinions of the hospital, medical staff, or nurses. Another criticism is that women who have cephalopelvic disproportion or abnormal labor patterns have longer labors and are more likely to need epidural anesthesia, operative vaginal deliveries, and cesarean sections; ie, epidural anesthesia and subsequent cesarean sections may be the result rather than the cause of abnormal or long labor patterns or cephalopelvic disproportion. Women who labor longer may be more likely to need epidural anesthesia.

In this population, however, at the time of this study, the only change from the first half of the year to the second was a change in health care reimbursement patterns. Overnight, the rate of epidural anesthesia use declined significantly for all women without any change in the population characteristics of women, hospital or hospital policy, nursing staff, nursing staff education, medical staff, physicians, anesthesiologists, or percentage of primiparous women. The demographic characteristics of the population of women who received and did not receive epidural anesthesia were the same. The number of LGA infants and infants between 3000 and 4000 g were similar for the populations of women who did and who did not use epidural anesthesia. Since there were no significant birthweight differences, these could not account for the decrease in the use of epidural anesthesia or for the shortening of the second stage of labor.

In this study, epidural anesthesia increased the mean length of the second stage of labor by 38 minutes for primiparas and 23 minutes for multiparas. A much larger study is needed to determine whether the findings related

to length of labor have any effect on maternal and fetal well-being.

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