

EDITORIAL VIEWS

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Epidural Analgesia and the Incidence of Cesarean Section

Time for a Closer Look

Randomized series examining the influence of epidural analgesia on the course and outcome of labor and delivery are rare. In this issue appear two such series reported by Chestnut *et al.*,^{1,2} the results of which contrast sharply with those from another randomized series recently reported by Thorp *et al.*³

Historic, and apparently ongoing, concerns center on whether epidural analgesia prolongs the first and second stages of labor and increases the frequency of malrotation and forceps delivery and the frequency of cesarean section. Previously, Chestnut *et al.* demonstrated that dense perineal analgesia during the second stage of labor increased the duration of the second stage of labor and the frequency of forceps delivery without influencing rotation or increasing the cesarean section rate.⁴ Evidence that this alteration in obstetric course adversely affected neonatal well-being was absent, allowing practitioners to make a value judgment between patient comfort and/or satisfaction and obstetric outcome.

More recently, Thorp *et al.* randomized 90 nulliparous patients to receive either intravenous opioid analgesia or epidural analgesia for pain relief of spontaneous labor as defined by painful contractions producing cervical effacement and dilatation.³ Intravenous meperidine (75 mg) and promethazine (25 mg) provided opioid analgesia while epidural analgesia with 0.25% bupivacaine followed by a continuous infusion of 0.125% bupivacaine maintained analgesia at a T10-T12 dermatomal level. Arrest of cervical dilatation in stage 1 or arrest of descent in stage 2 dictated cesarean section. Intrauterine pressure monitoring was used to assess the adequacy of labor. The results are striking. Patients receiving epidural analgesia experienced prolongation of both the first and second stages of labor, a twofold increase in oxytocin augmentation requirements, and a sharply increased cesarean section rate (25% *vs.* 2.2%) primarily accounted for by a higher

frequency of the diagnosis of dystocia. Although the authors originally intended to examine the outcome of 200 patients, they chose to terminate the study after only 93 cases because of ethical concerns regarding the large discrepancy in cesarean section rates.

Certainly, questions exist regarding this report. Would studying an additional 100 patients have changed the results? Furthermore, 11 of the 12 patients in the epidural analgesia group who underwent cesarean section received the epidural before achieving 5 cm dilatation. Although the authors used intrauterine pressure monitoring, one could still question the presence or quality of labor. Unfortunately, decisions regarding obstetric management, such as when to use oxytocin or what constituted arrest of cervical dilatation or descent of the head in the second stage, were not dictated by protocol but were made by the individual obstetrician aware of the patient's analgesic technique. In fact, the 25% incidence of cesarean section (16.7% for dystocia) in this prospective randomized study far exceeded the 14.1% overall incidence (11.4% for dystocia) reported in those authors' previous retrospective examination of 500 patients.⁵ The explanation for this dramatic increase in the cesarean section rate remains unknown. Thorp *et al.* also supplied little information regarding anesthetic management. For example, the infusion rate of bupivacaine is not stated. Was the infusion modified with the goal of minimizing excessive motor blockade? Thorp *et al.* speculated, after considering the results, and not as part of the original hypothesis, that early epidural analgesia may contribute to the cesarean section rate and recommended delaying initiation of epidural analgesia until the cervix is at least 5 cm dilated. They conclude that patients should be told that epidural analgesia will increase the likelihood of a cesarean section.

The results reported by Chestnut *et al.* in this issue contrast sharply with those of Thorp *et al.*³ In their first paper, Chestnut *et al.* asked the question, does early epidural analgesia alter the obstetric course in patients receiving oxytocin?¹ One hundred fifty nulliparous women, with cervical dilatation of at least 3 cm

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but less than 5 cm, who were already receiving oxytocin and requesting epidural analgesia, were randomized to receive either early (<5 cm) or late (\geq 5 cm) epidural analgesia. Patients receiving late epidural analgesia received 10 mg intravenous nalbuphine until they either achieved 5 cm dilatation or were rescued 1 h after a second bolus of nalbuphine. Epidural analgesia consisted of a test dose of 3 ml 1.5% lidocaine containing epinephrine, followed by 5 ml 0.25% bupivacaine, a continuous infusion of 0.125% bupivacaine, and additional boluses of 0.25% bupivacaine to maintain a sensory level of T10 or greater. Attempts were made to minimize motor blockade. In contrast to Thorp *et al.*'s findings, early epidural analgesia did not increase the frequency of instrumental delivery or cesarean section (18% *vs.* 19% in the early and late groups, respectively), nor was there a greater frequency of dystocia or prolongation of the second stage.

At first glance, this study appears to refute Thorp *et al.*'s assertion that early epidural analgesia is a problem, because the cesarean section rates in the early and late groups in Chestnut *et al.*'s series were equivalent. However, both groups received epidural analgesia and experienced cesarean section rates far exceeding those of the control group rate in Thorp *et al.*'s study. Another prospective randomized series previously compared epidural analgesia and parenteral opioids and concluded that epidural analgesia did not increase the likelihood of instrumental delivery or cesarean section.⁶ Unfortunately, the power of this study to detect differences regarding the diagnosis of failure to progress, prevalent in Thorp *et al.*'s series, was poor.⁶ So the question remained, does epidural block increase the risk for cesarean section?

In their second paper,² Chestnut *et al.* inquired whether early administration of epidural analgesia affected obstetric outcome in nulliparous women who are in spontaneous labor. Randomization criteria and anesthetic management were identical to those in their previous series. However, in this series, all patients were in spontaneous labor and were not receiving oxytocin, nor was oxytocin administration planned. The results were remarkably similar to their previous series in that early epidural analgesia did not prolong labor, increase the incidence of oxytocin augmentation, or increase the incidence of malposition, operative deliv-

ery, or cesarean section rate when compared with patients receiving intravenous nalbuphine. However, there was one important difference. The equivalent cesarean section rates in these patients in spontaneous labor were markedly less in both groups than in those receiving oxytocin: only 10% and 8% of the early and late groups, respectively, underwent cesarean section with similar indications for surgery in both groups.

Despite these findings, Chestnut *et al.* rightly point out that neither paper demonstrates that epidural analgesia does not affect labor. We can only conclude that early epidural analgesia does not increase risk for cesarean section when compared with that in patients receiving intravenous nalbuphine. What would have been the outcome if one group had never received epidural analgesia? Would there have been even fewer cesarean sections? These papers imply that oxytocin-augmented labor differs from spontaneous labor in posing greater risk for cesarean section either because of differences in the quality of labor or perhaps unidentified differences in obstetric management. The effects of epidural analgesia before 3 cm dilatation were not examined.

Resolving the issue of whether obstetric outcome and epidural analgesia are causally related will not be easy. Ethical concerns probably preclude a large-scale randomization of analgesic techniques, especially in centers where epidural analgesia is currently available. Thus, anesthesiologists must examine possible mechanisms whereby epidural analgesia could alter the cesarean section rate—again, not an easy task. For example, does epidural analgesia in some fashion diminish endogenous pulsatile oxytocin release preventing “normal labor”? Obstetricians have long believed that this is the case, but scientific proof is lacking. This could explain the difference in outcome between spontaneous and augmented labor. Does sympathetic denervation of the uterus impair contractility? We know that traumatic cord transection does not preclude normal labor in paraplegic patients. Does somatic motor blockade accompanying epidural analgesia, even in early labor, increase the likelihood of dystocia? Currently, epidural techniques using mixtures of extremely dilute bupivacaine with opioids are used widely and provide less motor blockade than occurs with bupivacaine alone.

Some circumstantial evidence suggests that technique of epidural analgesia may make a difference. Parker⁷ and Naulty *et al.*^{*} reported decreased cesarean section rates after a change in anesthetic practice whereby more

* Naulty JS, Smith R, Ross R: Effect of changes in labor analgesic practice on labor outcome (abstract). *ANESTHESIOLOGY* 69(suppl): A660, 1988.

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dilute bupivacaine⁷ or dilute bupivacaine combined with opioids* was substituted for more concentrated local anesthetic solutions. Both Thorp *et al.*³ and Chestnut *et al.*^{1,2} used plain bupivacaine, although Chestnut *et al.* emphasized that infusion rates were adjusted to minimize motor blockade and optimize expulsive effort. Would routine use of very dilute local anesthetic solutions influence outcome? Future studies should examine the impact on the cesarean section rate of anesthetic techniques specifically designed to increase the spontaneous vaginal delivery rate while maintaining acceptable analgesia in the first and second stages of labor.

Finally, we should examine the role of obstetric management in determining outcome. Carli *et al.*⁸ recently examined the effect of epidural analgesia in 1,250 nulliparous women whose labors were managed according to strict standardized criteria for the active management of labor. Active management included a strict diagnosis for active labor, prostaglandin usage for the induction of labor, artificial rupture of the membranes after the establishment of labor, and frequent examinations to guide the use of oxytocin augmentation to maintain normal progress in the first and second stages of labor. Active obstetric management of labor halved the cesarean section rate and decreased the incidence of forceps delivery in those authors' institution. Epidural analgesia, oxytocin requirements, and the induction of labor exerted additive influences on the mode of delivery. Of most interest to the current discussion were the low cesarean section rates: 7.5% in primiparas with epidural analgesia *versus* 3.5% without epidural analgesia. However, among women undergoing induction of labor with oxytocin, the cesarean section rate was 12% with epidural analgesia *versus* 11.8% without epidural analgesia. Because these women undergoing induction of labor clearly were at greater inherent risk for requiring cesarean section regardless of analgesic technique, one could conclude that any deleterious effect of epidural analgesia *per se* is relatively small and that dysfunctional labor is the more critical influence. These data also help explain the relatively high incidence of cesarean section in Chestnut *et al.*'s first study,¹ in which all women were receiving oxytocin for induction or augmentation of labor.

Nonetheless, it behooves anesthesiologists to ascertain the truth regarding epidural anesthesia and the ce-

sarean section rate from the perspective of quality medical care, a humanitarian approach to women in severe pain, and economic considerations. In the new and emerging health-care environment, quality of care will be closely scrutinized. If anesthesiologists cannot exclude a relationship between epidural analgesia and cesarean section, we must document the benefits in quality accompanying the technique.

Kaplan⁹ suggests that quality in medical care is defined by four parameters: mortality, morbidity, utility, and prognosis. Perhaps we should examine epidural analgesia in this context. For example, does epidural anesthesia diminish maternal mortality? Most anesthesiologists believe that general anesthesia for cesarean section increases the risk of maternal death when compared to that associated with regional anesthesia. The wide application of epidural analgesia during labor lessens the requirement for general anesthesia for emergent cesarean section. Does this practice really decrease maternal mortality? Until we have a national maternal outcome registry, this answer probably is inaccessible. Lessened morbidity also will be difficult to document. In this generally healthy population, small differences in outcome, either fetal or maternal, probably will remain elusive. However, traditional medical thinking also considers pain morbidity. Indeed, the recent American College of Obstetrics and Gynecology Committee Opinion stated, "Labor results in severe pain for many women. There is no other circumstance where it is considered acceptable for a person to experience severe pain, amenable to safe intervention, while under a physician's care. . . . Maternal request is a sufficient justification for pain relief during labor." † "Utility" attempts to weigh the relative importance of side effects and benefits. In this instance, what is the relative importance of an increase in cesarean section rate, if present, when weighed against the benefits of pain reduction and possible reductions in morbidity and mortality? Perhaps the consumer, the pregnant patient, will have a voice. Prognosis is the fourth parameter. If forced to make a choice between services, which is more appropriate in terms of allocation of financial and human resources: treatment of cancer pain or perhaps the more intense, but briefer pain of labor? These are tough questions. Perhaps those in the specialty of obstetric anesthesia, possibly through the Society for Obstetric Anesthesia and Perinatology, might join with their obstetric colleagues in attempting to answer these questions.

† American College of Obstetricians and Gynecologists: Committee Opinion: Pain Relief during Labor. Number 118. 1993.

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