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## REVIEW ARTICLE

# What's new in obstetric anesthesia?

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### ABSTRACT

The current article covers some of the major themes that emerged in 2009 in the fields of obstetric anesthesiology, obstetrics, and perinatology, with a special emphasis on the implications for the obstetric anesthesiologist.

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**Keywords:** Neuraxial Labor Analgesia; Maternal Obesity; Ultrasound Guidance; Epidural Catheter Design; Loss of Resistance Technique; Placebo; Nocebo; Consent; Communication; Progress Of Labor; Electrohysterography; Cesarean Delivery; Phenylephrine; Ephedrine; General Anesthesia; Awareness; Magnesium; Transversus Abdominal Plane Block; Chloroprocaine; Influenza A H1N1; Preeclampsia; Preterm Birth; Perinatal Neurologic Injury

## Introduction

Every year the Society for Obstetric Anesthesia and Perinatology (SOAP) nominates one individual to survey the prior year's literature and to identify the most notable individual papers and emerging themes for the science and practice of obstetric anesthesiology. A previous review summarized new evidence relating to safety and quality in peripartum care.<sup>1</sup> This review covers some of the additional topics published in 2009.

### Neuraxial labor analgesia

Maternal obesity may present some of the greatest technical challenges to an obstetric anesthesiologist, but new evidence confirms the clinical impression that not all obese women have difficult neuraxial block placements. An observational cohort study enrolled 427 women with body mass indices between 20 and 62 kg/m<sup>2</sup> to test the hypothesis that body mass index (BMI) would predict neuraxial technique difficulty as measured by the required number of needle passes.<sup>2</sup> Two predictors were significant: first, vaguely palpable or impalpable spinous

processes, and second, the patient's inability to create a convex contour at the skin when flexing her back. Obesity did not predict difficult placement directly, but did increase the likelihood of both difficult palpation and poor back flexion. A back examination should be performed as part of the standard anesthetic history and physical examination, and the probability of difficult neuraxial block placement factored in to any analgesic or anesthetic plan.

Block insertion under ultrasound guidance may be considered for women with difficult palpation, poor back flexion, or a history suggestive of difficult neuraxial block placement. In a preliminary study to evaluate the usefulness of ultrasound to facilitate block insertion, a cohort of 46 obese and morbidly obese women was used to correlate ultrasound depth to the epidural space with epidural needle depth.<sup>3</sup> Correlation was good (Pearson correlation coefficient 0.85 [95% confidence interval: 0.75–0.91]), with a tendency to underestimate true needle depth as the measured depth increased.

Previous comparisons between multi- and single-orifice epidural catheters have focused on standard nylon designs.<sup>4</sup> A 2009 trial randomized 486 women to compare two flexible epidural catheters with stainless steel coil reinforcement.<sup>5</sup> The primary outcome was complete analgesia at 30 min, and was not different between groups, at 85% for the single-orifice end-hole polyurethane catheter (Arrow FlexTip Plus) and 80% for the multi-orifice side-port soft polyamide catheters (Spirrol catheter) ( $P = 0.23$ ; 95% confidence interval (CI) of the difference 13% to –3%). There was also no difference in immediate or delayed epidural catheter replacement.

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Regardless of catheter design, the need for catheter replacement decreased maternal satisfaction measured at 24 h from 98% to 70% ( $P < 0.001$ ).

Many studies have examined the safety and efficacy of loss of resistance to saline versus air to guide epidural needle insertion for standard epidural catheter placement.<sup>6</sup> Grondin et al. enrolled 345 laboring women receiving the combined spinal–epidural (CSE) technique, in order to compare loss of resistance to saline versus air on resulting spinal and epidural analgesia.<sup>7</sup> In the majority of patients (338/345), cerebrospinal fluid returned spontaneously from the spinal needle and bupivacaine with fentanyl was dosed. The resulting spinal analgesia failure rate measured at 15 min was not different between groups, regardless of whether the epidural space had been identified by air or saline (4.2% vs. 4.9%,  $P = \text{NS}$ ). Likewise, the rate of epidural catheter replacement within the first 4 h was also similar between groups (2.9% vs. 5.1%,  $P = \text{NS}$ ). The seven patients without spontaneous clear fluid return from the spinal needle had an epidural catheter inserted without a spinal dose, and experienced a significantly higher rate of catheter replacement in the first 4 h (28% vs. 3%,  $P < 0.001$ ). The authors conclude that the loss of resistance technique is equally successful using air or saline, and the spontaneous return of clear fluid through the spinal needle increases the likelihood of successful epidural analgesia. In contrast, the practice of active aspiration may be unnecessary; spinal or epidural analgesic outcomes were not different regardless of whether additional clear fluid returned with aspiration before or after administering the spinal dose.

## Endogenous analgesia

Although neuraxial labor analgesia provides the most effective pain relief in contemporary practice, scientific understanding of placebo analgesia may lead to future analgesic techniques that are both effective and less invasive. Naloxone impairs placebo-induced analgesia, and functional magnetic resonance imaging (fMRI) studies have correlated this response to changes in pain-sensitive brain regions in the cortex. A healthy volunteer experiment combined a robust procedure to generate placebo analgesia, a randomized naloxone infusion, and fMRI, to show that placebo analgesia activates the entire descending opioidergic pain pathway<sup>8</sup> from the cortex down to the ipsilateral dorsal horn of the spinal cord.<sup>9</sup> Placebo analgesia is mediated not only through opioid, but also dopamine, and  $\beta$ -adrenergic pathways.<sup>10</sup> Hyperalgesia, also known as the nocebo effect, is mediated through cholecystokinin and deactivation of dopamine.

## Communication

Language may influence placebo and nocebo effects among obstetric patients, acting through both conscious

and subconscious processes and responses.<sup>11</sup> Communication practices including reflective listening, observing, acceptance, utilization, and suggestion may help to optimize patient experience. Words with negative emotional content such as “sting” should be avoided when possible unless the patient mentions them first, because these words can increase in the patient’s analgesic requirements and experience of pain. On the other hand, for the purpose of evaluation, a clear inquiry for specific symptoms (“Do you have any pain?”) is important to identify all patients who may benefit from treatment.<sup>12</sup> A survey of 100 women following cesarean delivery found that open questions (“How are you feeling?” and “Are you comfortable at the moment?”) failed to identify a significant proportion experiencing any pain (25/65 [35%]), including those who desired additional pain medication (2/5 [40%]).

An appropriate balance between clear communication and optimistic suggestion is particularly important in establishing rapport with patients while obtaining effective informed consent. The Obstetric Anaesthetists’ Association (OAA) has published a standardized epidural information card that describes the procedure, its benefits, common problems, and a dozen risks ranging in frequency from 1 in 8 for inadequate analgesia to 1 in 250 000 for paralysis or other severe injury.<sup>13</sup> The card has been translated from English into at least 26 other languages. A survey of OAA members conducted in 2007 demonstrated widespread support for the national standardized information card.<sup>14</sup>

The challenge of rapidly obtaining informed consent from the obstetric patient in active labor may be particularly acute for anesthesiologists in training.<sup>15</sup> Effective communication is central to high quality patient care, and innovative educational programs to develop communication and other non-technical skills are emerging.<sup>15–17</sup> Writing about personally encountered ethical, practical, and relational challenges may help participants to engage more fully in these educational experiences.<sup>15</sup> The informal curriculum is also important. Attentive faculty can identify interpersonal challenges in real time, model effective responses, and encourage resident physicians to consider and reflect on actual events.<sup>17</sup>

## The progress of labor

Several new methods to measure the progress of labor were described in the 2009 literature, including non-linear mixed effects modeling (NONMEM) and electrohysterography. NONMEM was originally developed to analyze pharmacokinetic and pharmacodynamic data, allowing for adjustment for correlations between repeated measures while adjusting for the effects of potential covariates. Recently this analytic technique was applied to build a sigmoidal mathematical model of

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