

# Epidural Analgesia for Labor

## Continuous Infusion Versus Programmed Intermittent Bolus

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### KEYWORDS

- Neuraxial analgesia • Labor • Epidural • Combined-spinal epidural (CSE)
- Automated pump • Continuous epidural infusion (CEI)
- Programmed intermittent epidural bolus (PIEB)
- Patient-controlled epidural analgesia (PCEA)

### KEY POINTS

- The programmed intermittent epidural bolus (PIEB) technique, as a maintenance mode for labor analgesia, may offer multiple benefits over the current traditional continuous infusion technique.
- Proposed benefits of the PIEB technique, as indicated by multiple studies, include the use of less local anesthetic and opioids, the occurrence of less breakthrough pain, improved patient satisfaction, and a lower incidence of both motor block and instrumental vaginal delivery.
- Fine-tuning appropriate algorithms using advanced pump technology in tandem with studies to determine the optimal combination of volume, rate, time interval, and drug concentrations are needed to improve the use of the intermittent bolus technique in clinical practice.
- More studies are necessary to consistently demonstrate an improvement in labor analgesia, and maternal and fetal obstetric outcomes with the intermittent bolus technique.

### INTRODUCTION: LABOR ANALGESIA

Although once controversial, the current preferred use of neuraxial analgesic techniques by anesthesiologists, obstetricians and patients for labor, has almost established these modalities as the standard of care for labor pain in developed countries such as the United States. The use of neuraxial techniques, such as epidural and combined spinal-epidural (CSE) analgesia, has been shown to be the most effective

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modality for pain relief in labor.<sup>1</sup> In addition to providing analgesic benefits to the mother, neuraxial analgesia can be converted to surgical anesthesia if operative delivery is required.<sup>2,3</sup>

The updated guidelines for labor analgesia, as proposed by the American Society of Anesthesiologists (ASA) Task Force and Committee on Standards and Practice Parameters in 2016, recommend that the choice of analgesic technique depend on the medical status of the patient, anesthetic risk factors, obstetric risk factors, patient preferences, progress of labor, and resources at the facility. With sufficient resources, neuraxial analgesic techniques should be offered among the analgesic options for labor with the primary goal of providing adequate maternal analgesia with minimal motor block (eg, achieved with the administration of local anesthetics at low concentrations with or without opioids).<sup>4</sup> Guidelines advocate the use of dilute concentrations of local anesthetics with opioids to produce as little motor block as possible. A local anesthetic may be added to a spinal opioid to increase duration and improve the quality of analgesia. A catheter technique should be considered if labor is expected to last longer than the analgesic effects of the spinal drugs chosen, or if there is a good possibility of operative delivery.<sup>4</sup> CSE techniques may be used to provide effective and rapid onset of analgesia for labor. Patient-controlled epidural analgesia (PCEA) may be used to provide an effective and flexible approach for the maintenance of labor analgesia. The use of PCEA may be preferable to fixed-rate continuous infusion epidural for providing fewer anesthetic interventions and reducing dosages of local anesthetics. PCEA may be used with or without a background infusion.<sup>4</sup>

In many institutions in North America and Europe, neuraxial labor analgesia is initiated with a local anesthetic and an opioid using the epidural or CSE technique. Maintenance regimens have evolved from manual boluses by the clinician to continuous infusions alone and, subsequently, with patient-controlled boluses through a pump.<sup>5</sup> PCEA with or without a background continuous epidural infusion (CEI) is currently the most used technique.<sup>5</sup> The current maintenance regimen consists of a combination of a local anesthetic with an opioid administered through an epidural catheter using an automated epidural pump. Given that most providers support the use of neuraxial analgesia for labor, it is crucial that attempts are made to optimize the different techniques available for the maintenance of analgesia throughout labor.

The benefits of the CEI and programmed intermittent epidural bolus (PIEB) techniques for labor analgesia are reviewed in this article. In addition, the clinical implications and challenges encountered with each technique, and current controversies and areas for further research will be discussed to maximize the effective use of these analgesic modalities for labor pain.

## MAINTENANCE OF LABOR ANALGESIA

Once labor analgesia is established by using an epidural or CSE technique, maintenance of analgesia can be achieved with<sup>1</sup> (1) CEI or (2) PIEB, each supplemented by the use of (3) PCEA ([Table 1](#)).

### *Continuous Epidural Infusion*

In the past, CEI compared with manual intermittent boluses by the anesthesiologist or with PCEA alone, had been associated with a more consistent and smoother analgesia, improved patient satisfaction, and reduced workload for the anesthesiologist.<sup>6</sup> The traditional practice, therefore, has involved maintaining epidural analgesia for labor with the combination of a local anesthetic and opioid administered via CEI with the use of PCEA for breakthrough pain.<sup>7</sup> However, the utility of CEI for maintenance of

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