

Precision Obstetric Anesthesia and Analgesia: An Attempt to Assess the Emerging Modalities within the Fundamental Framework

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Pain management associated with childbirth is complex, with acute pain spanning from acute non-incisional pain in vaginal delivery (VD) to incisional pain post-cesarean delivery (CD). Chronic postpartum pain can be any combination of perineal, vaginal, pelvic girdle, incisional, neuropathic, or back pain. Nine articles contributing to this thematic issue, “Childbirth and Postpartum Pain: The Importance of Maternal Pain Control Beyond the Birth Experience”, attempted to evaluate the utility of emerging pain management techniques within the current evidence-supported obstetric anesthesia and analgesia regimen.

Neuraxial blockade, including spinal and epidural anesthesia, is the foundation of obstetric anesthesia. Landmark-based block placement in the L2-3, L3-4, and L4-5 spaces, historically used safely and effectively, will continue to be the dominant technique for labor analgesia and CD. The recent adoption of ultrasound enables the precise identification of neuraxial space to the extent that Zhou et al are empowered to explore the domain of precision obstetric anesthesia. In this study protocol, “The Effects of Different Puncture Points on Labor Analgesia Onset: Study Protocol for a Randomized Controlled Trial”,¹ the authors asked whether there would be outcome differences between epidural anesthesia performed at L2-3 and L3-4 spaces when relevant outcomes, such as analgesic efficacy, motor and sensory dermatomal coverage, and patient satisfaction were assessed.

This single center RCT study. “*Effects of Hyperbaric and Isobaric Bupivacaine on Hemodynamic Profiles and Block Characteristics Among Parturients Undergoing Elective Cesarean Section Under Spinal Anesthesia: A Randomized Controlled Trial*”,² Beshia, A. et al studied 12.5 mg isobaric versus hyperbaric bupivacaine in spinal anesthesia for CD, and reported that the hyperbaric group had a faster onset time for achieving the maximum sensory block, with a median time of 3 (1) compared to 4 (2) minutes in the isobaric group ($p < 0.001$), confirming previous Cochrane review that the only consistently observed difference between these two regimen is the onset of blockade.³

The role of peripheral nerve block in CD in the era of early recovery after childbirth has been a hot research topic in the past decade. In this narrative review “Regional Analgesia for Cesarean Delivery: A Narrative Review Toward Enhancing Outcomes in Parturients” by Silverman M, et al,⁴ the authors delve deep into the literature on the benefits of a diverse range of peripheral nerve blocks in the presence and absence of intrathecal morphine in CD analgesia. Evidence overwhelmingly supports the benefits of any abdominal peripheral nerve block, from TAP and quadratus lumborum (QL) block, to the erector spinae plane (ESP) block in the absence of intrathecal morphine. In the presence of intrathecal morphine, the controversy persists and requires further study. There is currently no evidence to support TAP block use in conjunction with intrathecal morphine, but exploratory data on emerging fascial plane blocks anatomically close to the sympathetic trunk, including QL and ESP blocks, have shown promising results and better efficacy than TAP. In addition, although nerve blocks may not have statistically significant and/or clinically relevant outcome benefits in opioid-naive patients, their role in certain subsets of patients that are not included in most clinical studies, such as those with substance use disorders and chronic pain, has not been properly assessed.

Remifentanyl is commonly used in patients with contraindications to regional anesthesia techniques, but the ideal route and dose remain unknown. In this study “Remifentanyl at a Relatively Elevated Dose in Active Phase is Safe and More Suitable Than Fixed Lower Dose for Intravenous Labor Analgesia”,⁵ Meng, C et al showed in 115 patients RCT study that in the active stage I labor a moderate increase on the remifentanyl rate from the latent phase dose of 0.03 mcg/kg/min to 0.05 mcg/kg/min demonstrated significantly lower pain scores and improved satisfaction without changes on the incidence of adverse reactions, though remifentanyl-induced hyperalgesia was not assessed in this study.

The NMDA antagonist ketamine, an opioid-reducing anesthetic, has been successfully used for pain relief during labor and delivery. Esketamine, an S+ isomer of ketamine with a relatively low risk of side effects and twice as potent as ketamine, has recently been approved for the management of treatment-resistant depression.⁶ In particular, peripartum use has been documented to mitigate the risk of postpartum depression, which has a complex association with persistent postpartum pain.⁷ In this single-center RCT study, “*Analgesic Effect of Esketamine Combined with Tramadol for Patient-Controlled Intravenous Analgesia After Cesarean Section: A Randomized Controlled Trial*”,⁸ Guo, Y. et al utilized esketamine to replace the opioid partial agonist tramadol, resulting in statistically significant, clinically unlikely relevant differences in pain scores while achieving opioid-reducing effects.

Virtual reality (VR) technology via distraction has exhibited promising results in labor analgesia in recent years. In this innovative study, “The Effect of Virtual Reality Glasses Applied During the Episiotomy On Pain and Satisfaction: A Single Blind Randomized Controlled Study”,⁹ Orhan, M. et al addressed episiotomy repair in 50 patients after vaginal delivery in the presence versus absence of VR image. Based on the improved maternal satisfaction with the birth experience, the authors recommended VR to be used as an easily applicable nonpharmacological and noninvasive adjunct analgesic modality.

Persistent postpartum pain (PPP) and opioid use in opioid-naïve and-tolerant patients continue to pose challenges to obstetric healthcare workers. In this narrative review “Persistent Postpartum Pain – A Somatic and Psychologic Perfect Storm”,¹⁰ Horvath, B et al emphasized the uniqueness of parturient pain in that it has at least three components, not only pain intensity, but also pain-related distress and pain-related interference with ability to taking care of the new born are relevant for the new mothers. The authors further discussed from the etiological perspective that PPP after VD and CD are two separate entities due to different mechanisms of tissue trauma, resulting in significant differences in pain location and functional disability. The authors emphasized the association between the postpartum opioid prescription dose and peripartum opioid prescription filling rate.¹¹ In addition, the lower rate of PPP and chronic opioid use in VD than in CD has unique implications, particularly with the continuous rise in the proportion of CD in childbirth in the United States and globally.

Obstetric anesthesia providers are seeing a continuous increase in the number of pregnant patients with opioid use disorder (OUD) who present to labor and delivery services. These patients are at increased odds of major obstetric morbidity and mortality and require an interdisciplinary approach consisting of a team of obstetricians, anesthesiologists, addiction medicine specialists, psychiatrists, and social workers. In this narrative review, “Multimodal Acute Pain Management in the Parturient with Opioid Use Disorder: A Review”,¹² by Koltenyuk et al, the authors urged the importance of maintaining these patients on medication treatment rather than opting for supervised withdrawal and recommended buprenorphine as a better choice than methadone due to similar outcomes, greater accessibility, and higher safety because of its lack of drug interactions and ceiling effects. The authors discussed in details on the management of women on naloxone/naltrexone during pregnancy which demands careful planning at multiple stages, from the timing of discontinuation before delivery in order to maximize response to opiates, to heightened sensitivity to opioids post-discontinuation when a critical portion of opioid receptor is no longer being occupied by naloxone/naltrexone, from the timing to restart naloxone/naltrexone postpartum after proper duration of opioid abstinence (shorter in VD than CD) to minimize opioid withdrawal symptoms, to awareness on the increased risk of postpartum OUD relapse.

The key topics covered in this collection are reflected in this literature analysis, *Bibliometric Analysis of Research Studies on Postoperative Pain Management of Cesarean Section*,¹³ Zhai, Wet al reported the most commonly encountered keywords in obstetric anesthesia were “prescription”, “quadratus lumborum block”, “postnatal depression”, “persistent pain”, “enhanced recovery”, and “multimodal analgesia”, indirectly indicating the trend for current active research in obstetric anesthesia and analgesia.¹³ Among the top three most-cited articles, one was the QL block in CD pain control, and two in postoperative opioid prescription and persistent opioid use.

In summary, multimodal analgesia, which includes neuraxial anesthesia, acetaminophen, and NSAID, continues to be standard peripartum care. In addition, traditional and emerging fascial plane blocks and opioid-sparing adjuvants can be beneficial and should be considered on an individual basis, particularly for patients at an increased risk of poorly controlled acute pain and persistent postpartum pain.

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