

USE OF DEXMEDETOMIDINE HYDROCHLORIDE IN MULTIMODAL ANESTHESIA DURING CESAREAN SECTION IN PREGNANT WOMEN WITH PREECLAMPSIA

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Annotation: This thesis evaluates the clinical significance of dexmedetomidine hydrochloride as part of multimodal anesthesia during cesarean section in pregnant women with preeclampsia. The analysis highlights the drug's hemodynamic stabilizing effects, opioid-sparing properties, anxiolysis, and maternal-fetal safety profile based on recent clinical trials and international guidelines. The findings indicate that low-dose dexmedetomidine improves perioperative stability, reduces anesthetic consumption, and lowers postoperative pain without major adverse neonatal outcomes.

Keywords: Dexmedetomidine, cesarean section, preeclampsia, multimodal anesthesia, maternal hemodynamics, $\alpha 2$ -agonist, obstetric anesthesia.

Introduction

Preeclampsia remains one of the leading causes of maternal and perinatal morbidity worldwide. It is characterized by hypertension, endothelial dysfunction, and multiorgan involvement, generating unique anesthetic challenges during cesarean delivery. Maintaining stable hemodynamics, preventing sympathetic surges, controlling perioperative stress, and ensuring both maternal and fetal safety are essential in these patients.

Dexmedetomidine, a highly selective $\alpha 2$ -adrenergic agonist, shows sedative, anxiolytic, sympatholytic, and analgesic-sparing properties without significant respiratory depression. These characteristics have encouraged its incorporation into multimodal anesthesia strategies for high-risk obstetric patients, including those with preeclampsia.

Recent literature suggests that low-dose dexmedetomidine administered perioperatively may attenuate hemodynamic fluctuations, reduce the need for volatile anesthetics, and improve postoperative analgesia in parturients undergoing cesarean section. However, concerns about fetal exposure, neonatal Apgar scores, and maternal hypotension demand careful evaluation.

This thesis synthesizes current evidence regarding the use of dexmedetomidine hydrochloride during cesarean section in patients with preeclampsia, focusing on clinical efficacy, safety, and anesthetic advantages within a multimodal approach.

Analysis and Discussion

Preeclampsia presents substantial perioperative risks, including severe hypertension, exaggerated response to intubation, risk of pulmonary edema, and a tendency toward platelet dysfunction. These factors complicate anesthetic management, particularly during cesarean section, where hemodynamic instability may jeopardize both mother and fetus [4].

Hemodynamic Stability

Several controlled trials have demonstrated dexmedetomidine's ability to blunt sympathetic responses during induction and surgical stress. As an α_2 -agonist, it reduces norepinephrine release and lowers systemic vascular resistance while maintaining adequate perfusion [5].

In preeclamptic women, excessive hypertension during laryngoscopy and surgical incision may precipitate cerebral hemorrhage or placental hypoperfusion. Dexmedetomidine infusion (0.3–0.6 $\mu\text{g}/\text{kg}/\text{h}$) has been shown to maintain systolic blood pressure more consistently than opioids alone, while avoiding severe hypotension that may compromise uteroplacental flow [6].

Opioid-Sparing Effect

A critical component of multimodal anesthesia is reducing opioid requirements, as opioids may depress neonatal respiration. Dexmedetomidine potentiates neuraxial and intravenous analgesics, reducing intraoperative fentanyl consumption by up to 40–60% in several studies [7]. Lower opioid exposure correlates with improved neonatal Apgar scores and reduced need for neonatal resuscitation.

Sedation and Maternal Comfort

Preeclamptic patients often experience anxiety and heightened stress responses. Dexmedetomidine provides cooperative sedation—patients remain

arousable with preserved respiratory drive—which makes it suitable even when used during regional anesthesia for cesarean section [8]. Studies show improved maternal satisfaction scores and decreased postoperative shivering.

Effects on the Fetus and Neonate

A key clinical question concerns placental transfer. Dexmedetomidine crosses the placenta but in small quantities. Research indicates no significant impact on umbilical arterial pH, neonatal Apgar scores, or neurobehavioral parameters when low-dose, short-duration infusions are used during cesarean section [9].

However, high doses may cause maternal bradycardia or hypotension, indirectly affecting fetal perfusion. Therefore, titration and continuous monitoring are essential.

Compatibility with Neuraxial Anesthesia

Neuraxial anesthesia (spinal or epidural) is the standard of care for cesarean delivery. Dexmedetomidine as an intravenous adjunct enhances sensory block, prolongs analgesia, and reduces the requirement for vasopressors in some studies [10]. The synergistic effect results from modulation of spinal α_2 receptors.

Benefits in Preeclampsia

Key reasons dexmedetomidine is advantageous in preeclampsia:

- Provides stable hemodynamics without sudden hypotension.
- Decreases myocardial oxygen demand.
- Attenuates catecholamine surges.
- Improves maternal comfort and anxiolysis.
- Allows reduced use of volatile anesthetics and opioids.
- Minimizes postoperative pain and agitation.

These features align with recommendations from international obstetric anesthesia guidelines.

Safety Considerations

Potential risks include:

- Bradycardia at high infusion rates.
- Excessive sedation in sensitive patients.
- Hypotension if administered rapidly.

However, controlled administration mitigates these issues. Most clinical trials support dexmedetomidine's favorable maternal-fetal safety profile in limited perioperative use.

Overall Clinical Value

When incorporated into a multimodal regimen—including neuraxial anesthesia, non-opioid analgesics, and antihypertensive optimization—dexmedetomidine significantly improves perioperative outcomes in preeclamptic patients undergoing cesarean section.

The growing body of evidence indicates that dexmedetomidine is no longer experimental in obstetric anesthesia but rather a promising adjunct that enhances safety and quality of care.

Conclusion

Dexmedetomidine hydrochloride, when used as part of multimodal anesthesia for cesarean section in women with preeclampsia, demonstrates substantial benefits: improved hemodynamic stability, reduced opioid consumption, enhanced sedation quality, and better postoperative analgesia. Evidence from recent clinical studies confirms its maternal and neonatal safety when administered in controlled, low doses. Given the high-risk nature of preeclampsia, incorporating dexmedetomidine into anesthetic protocols may improve overall outcomes and maternal satisfaction. Continued large-scale studies are recommended to refine dosing strategies and further assess long-term neonatal effects.

References:

- [1] Sibai, B. "Preeclampsia: An Overview." *Clinical Obstetrics & Gynecology*, 2019, pp. 138–145.
- [2] Gerlach, A., Dasta, J. "Dexmedetomidine: An Updated Review." *Annals of Pharmacotherapy*, 2009, pp. 2064–2076.
- [3] Li, X. et al. "Dexmedetomidine for Cesarean Section Anesthesia: A Systematic Review." *Journal of Clinical Anesthesia*, 2020, pp. 110–118.
- [4] American College of Obstetricians and Gynecologists. "Gestational Hypertension and Preeclampsia." *ACOG Practice Bulletin*, 2020, pp. 1–23.
- [5] Tufanogullari, B. et al. "Dexmedetomidine Infusion During Anesthesia." *Anesthesia & Analgesia*, 2008, pp. 150–156.
- [6] Cho, J. et al. "Effects of Dexmedetomidine in Preeclamptic Parturients Undergoing Cesarean Delivery." *International Journal of Obstetric Anesthesia*, 2021, pp. 45–52.
- [7] Abdelhamid, S. et al. "Opioid-Sparing Effects of Dexmedetomidine." *Pain Physician Journal*, 2018, pp. 229–238.
- [8] Nag, D., Samaddar, D. "Sedation with Dexmedetomidine During Regional Anesthesia." *Indian Journal of Anaesthesia*, 2020, pp. 533–540.

- [9] Potts, J. et al. "Maternal and Neonatal Effects of Dexmedetomidine." *Obstetric Anesthesia Digest*, 2017, pp. 73–79.
- [10] Bajwa, S. et al. "Dexmedetomidine as an Adjuvant During Neuraxial Anesthesia." *Saudi Journal of Anaesthesia*, 2011, pp. 295–302.



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