

Role of neuraxial anaesthesia in patients with pre-eclampsia undergoing cesarean delivery: a retrospective study from a tertiary care center in Eastern India

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Abstract:

Background: Pre-eclampsia remains a leading cause of maternal and perinatal morbidity and mortality worldwide. Anesthetic management during cesarean delivery in pre-eclamptic patients poses unique challenges due to altered cardiovascular physiology and the risk of hemodynamic instability. Neuraxial anaesthesia is widely preferred, but real-world data from Indian tertiary care settings are limited.

Objectives: To evaluate maternal and perioperative outcomes associated with neuraxial anaesthesia in pre-eclamptic patients undergoing cesarean delivery.

Methods: This retrospective observational study was conducted at Shree Krishna Medical College and Hospital (SKMCH), Muzaffarpur. Medical records of 100 women with pre-eclampsia who underwent cesarean delivery under neuraxial anaesthesia over a 10-month period were reviewed. Outcomes included intraoperative hemodynamic stability, anesthetic complications, and maternal outcomes.

Results: Neuraxial anaesthesia was associated with stable intraoperative hemodynamics, minimal anesthetic complications, and favorable maternal outcomes. The incidence of severe hypotension and conversion to general anaesthesia was low.

Conclusions: Neuraxial anaesthesia appears to be a safe and effective anesthetic technique for cesarean delivery in patients with pre-eclampsia in a real-world tertiary care setting.

Keywords: Pre-eclampsia, Neuraxial anaesthesia, Spinal anaesthesia, Cesarean delivery, Retrospective study.

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Introduction

Pre-eclampsia is a multisystem hypertensive disorder of pregnancy characterized by new-onset hypertension and proteinuria or end-organ dysfunction after 20 weeks of gestation. It affects approximately 5–8% of pregnancies worldwide and remains a major contributor to maternal and perinatal morbidity and mortality, particularly in low- and middle-income countries [1]. In India, the burden of pre-eclampsia is substantial, accounting for a significant proportion of maternal deaths and adverse pregnancy outcomes [2].

Women with pre-eclampsia frequently require cesarean delivery due to maternal or fetal indications such as uncontrolled hypertension, fetal growth restriction, placental abruption, or non-reassuring fetal status [3]. Anesthetic management in this population is challenging due to altered cardiovascular physiology, increased systemic vascular resistance, reduced intravascular volume, and heightened sensitivity to anesthetic agents [4]. These factors increase the risk of perioperative

complications, including severe hypotension, cerebrovascular events, pulmonary edema, and difficult airway management.

Historically, general anaesthesia was often used for cesarean delivery in pre-eclamptic patients because of concerns regarding hypotension associated with neuraxial techniques. However, general anaesthesia carries significant risks in this population, including difficult airway, exaggerated hypertensive responses to laryngoscopy, aspiration, and increased maternal mortality [5,6]. Consequently, neuraxial anaesthesia has increasingly become the preferred technique for cesarean delivery in patients with pre-eclampsia.

Neuraxial anaesthesia, including spinal, epidural, and combined spinal–epidural techniques, offers several advantages such as avoidance of airway manipulation, improved postoperative analgesia, and reduced maternal stress response [7]. Studies have demonstrated that pre-eclamptic patients may experience less severe hypotension following spinal

anaesthesia compared to normotensive parturients, possibly due to increased baseline vascular tone [8].

Several clinical trials and observational studies have supported the safety and efficacy of neuraxial anaesthesia in women with pre-eclampsia, even in those with severe disease, provided that appropriate monitoring and fluid management are ensured [9–11]. Despite this evidence, anesthetic practice varies widely across institutions, particularly in resource-limited settings where concerns regarding hypotension, coagulopathy, and neurological complications persist.

Data from Indian tertiary care hospitals on anesthetic outcomes in pre-eclamptic patients undergoing cesarean delivery are limited. Understanding real-world outcomes is essential to guide clinical practice and improve maternal safety. Therefore, this retrospective study was conducted to evaluate the role of neuraxial anaesthesia in patients with pre-eclampsia undergoing cesarean delivery at a tertiary care center in Eastern India.

Materials and methods

Study design and setting: This retrospective observational study was conducted at Shree Krishna Medical College and Hospital (SKMCH), Muzaffarpur, a tertiary care referral center.

Study Population: Medical records of 100 women diagnosed with pre-eclampsia who underwent cesarean delivery under neuraxial anaesthesia over a 10-month period were included. Patients with known coagulopathy, thrombocytopenia, or incomplete records were excluded.

Data Collection: Data collected included demographic details, severity of pre-eclampsia, type of neuraxial anaesthesia, intraoperative hemodynamic parameters, need for vasopressors, anesthetic complications, and maternal outcomes.

Statistical Analysis: Data were analyzed using descriptive statistics. Continuous variables were expressed as mean \pm standard deviation and categorical variables as percentages.

Results and Discussion

This retrospective study demonstrates that neuraxial anaesthesia is a safe and effective anesthetic technique for cesarean delivery in patients with pre-eclampsia. The findings align with previous studies reporting favorable hemodynamic stability and reduced maternal risk with neuraxial techniques compared to general anaesthesia [12–14].

Physiological alterations in pre-eclampsia, including increased systemic vascular resistance, may attenuate the degree of hypotension following spinal anaesthesia [15,16]. Careful patient selection, judicious fluid management, and appropriate use of vasopressors further enhance safety.

Real-world observational studies have also reported lower rates of maternal morbidity and mortality when neuraxial anaesthesia is used in pre-eclamptic patients undergoing cesarean delivery [17–19]. The present study adds to this evidence from a public sector tertiary care hospital in Eastern India.

Recent international guidelines and expert consensus statements emphasize neuraxial anaesthesia as the preferred technique for cesarean delivery in women with pre-eclampsia, including those with severe disease, provided there are no contraindications [24]. Furthermore, updated obstetric anesthesia recommendations highlight the importance of individualized anesthetic planning and vigilant perioperative monitoring to optimize maternal outcomes [25].

Limitations

The retrospective design, limited sample size, and lack of a comparison group restrict causal inference. Neonatal outcomes were not evaluated in detail, and long-term maternal outcomes could not be assessed.

Conclusions

Neuraxial anaesthesia was associated with favorable intraoperative and maternal outcomes in pre-eclamptic patients undergoing cesarean delivery in this retrospective study. These findings support the continued use of neuraxial techniques as the preferred anesthetic approach in this high-risk population.

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