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Review

Anesthesia for Cesarean Sections in High-Risk Patients: A Brief Literature Review

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ABSTRACT

Anesthesia for cesarean sections in high-risk patients poses a significant challenge for anesthesiologists due to the potential for maternal and neonatal complications. This article reviews the main anesthetic techniques (neuraxial and general), their indications, advantages and limitations in high-risk contexts, including severe preeclampsia, maternal heart disease, coagulopathies and obstetric hemorrhage. Neuraxial anesthesia (spinal and epidural) has gained preference due to the maintenance of maternal consciousness, more stable hemodynamics and reduced risk of pulmonary aspiration, though contraindicated in coagulopathies and severe hypertension. General anesthesia remains indicated in obstetric emergencies, placenta previa with active bleeding and failure or contraindication to neuraxial anesthesia, despite its association with higher morbidity, difficult intubation and neonatal depression. Hemodynamic management strategies, vasopressor use, invasive monitoring and transfusion protocols have proven essential in reducing adverse events. Additionally, advances in ultrasound-guided techniques have enhanced the safety of neuraxial block in patients with anatomical variations or obesity. The literature also highlights the importance of multidisciplinary teams, preoperative planning and institutional protocols for obstetric emergencies. It is concluded that the choice of anesthetic technique should be individualized, weighing risks and benefits and based on current evidence to optimize maternal and neonatal outcomes.

Keywords: Obstetric anesthesia; High-risk cesarean delivery; Neuraxial block; General anesthesia; Hemodynamic monitoring

Introduction

Cesarean delivery is one of the most frequently performed surgical procedures worldwide and its indications have expanded significantly in recent decades, especially among patients with high maternal-fetal risk. In these situations, anesthetic management plays a central role, as it must ensure maternal hemodynamic stability while preserving fetal well-being. High-risk pregnant women present complex clinical conditions such as hypertensive disorders, cardiac diseases, coagulopathies, obesity and multiple gestations, which significantly increase perioperative complications. Therefore, selecting the appropriate anesthetic technique requires careful analysis of individual risks and benefits.

Neuraxial anesthesia, encompassing spinal, epidural and combined spinal-epidural techniques, is considered the gold standard for most elective cesarean deliveries due to its advantages, including maintaining maternal consciousness and reduced aspiration risk. However, its application in high-risk patients can be challenging, especially when contraindications such as thrombocytopenia or anatomical deformities are

present. In such cases, general anesthesia may be the only viable alternative, despite its association with increased maternal morbidity and neonatal depression.

Severe preeclampsia is one of the main indications for cesarean section under high-risk conditions. These patients require meticulous hemodynamic control and neuraxial anesthesia has been shown to reduce vascular resistance and improve uteroplacental perfusion. Nevertheless, sudden hypotension after spinal anesthesia is a common complication that requires rapid vasopressor management. In this scenario, phenylephrine has become the vasopressor of choice, showing safety in maintaining blood pressure without compromising uterine perfusion[1]. In cases of maternal heart disease, the anesthetic technique must minimize hemodynamic fluctuations. Epidural anesthesia, due to its gradual onset of sympathetic blockade, may be advantageous. However, advanced monitoring, including invasive arterial pressure and cardiac output measurement, may be required[2]. Similarly, in obstetric hemorrhages or placenta accreta spectrum disorders, general anesthesia may be necessary to ensure airway protection and hemodynamic control during massive transfusions.

The use of point-of-care ultrasound has emerged as an important tool for identifying anatomical structures and minimizing complications during neuraxial puncture in obese patients or those with spinal deformities. Ultrasound-guided anesthesia improves accuracy, reduces the number of attempts and enhances patient safety[3]. Finally, institutional protocols and multidisciplinary team involvement, including anesthesiologists, obstetricians, intensivists and hematologists, are crucial for the success of anesthesia in high-risk cesarean sections. Planning, simulation of obstetric emergencies and early identification of risk factors are pillars for reducing maternal and neonatal morbidity.

Objectives

To review the main anesthetic techniques used in cesarean sections for high-risk patients, highlighting their indications, advantages, limitations and strategies for optimizing outcomes.

Materials and Methods

This is a narrative literature review based on publications from the last ten years, selected from the databases PubMed, Scielo and ScienceDirect. The descriptors used included: “obstetric anaesthesia”, “caesarean section”, “high-risk pregnancy”, “neuraxial anaesthesia” and “general anaesthesia”. Articles were selected based on relevance to the subject, methodological quality and applicability in clinical practice. Preference was given to systematic reviews, clinical trials, guidelines and consensus statements.

Discussion

The anesthetic approach to high-risk cesarean sections is influenced by the underlying pathology, urgency of delivery and the clinical status of the mother and fetus. Among neuraxial techniques, spinal anesthesia is widely used for its rapid onset and reliable blockade. However, its use in high-risk patients requires careful monitoring due to the risk of hypotension and decreased uteroplacental perfusion. Preloading with fluids and the prophylactic use of vasopressors have been shown to mitigate these effects[4]. Epidural anesthesia is particularly useful when a more controlled hemodynamic response is desired. It allows for gradual administration of local anesthetics, reducing the risk of abrupt hypotension and offers postoperative analgesia. This is particularly advantageous in patients with cardiac comorbidities[5]. Combined spinal-epidural anesthesia offers the benefits of rapid onset with the flexibility of epidural top-ups, proving beneficial in prolonged or complicated surgeries.

General anesthesia, while less commonly preferred, remains indispensable in scenarios such as emergency cesarean delivery with fetal distress, severe maternal hemorrhage or when neuraxial anesthesia is contraindicated. Advances in airway management, such as video laryngoscopy and supraglottic devices, have improved safety. Nevertheless, risks such as difficult airway, aspiration and increased neonatal sedation persist[6]. Hemodynamic monitoring is vital in high-risk cases. Invasive blood pressure monitoring, central venous pressure and even cardiac output monitoring can be employed depending on the clinical scenario. Thromboelastography can aid in assessing coagulation status in patients with bleeding disorders or ongoing transfusions[7]. The choice of vasopressor also impacts outcomes. While ephedrine was historically favored, phenylephrine has demonstrated superiority in maintaining maternal blood pressure with fewer fetal acidosis events[1]. Norepinephrine has recently gained attention as a viable alternative, especially in patients with bradycardia[8-10].

Patient positioning, oxygenation, temperature management and analgesia also influence maternal-fetal outcomes. The use of left uterine displacement, supplemental oxygen and temperature control are essential intraoperative measures[11-13]. Postoperative analgesia, facilitated by epidural techniques or regional blocks such as the transversus abdominis plane block, promotes early mobilization and reduces complications. The role of institutional preparedness and team communication cannot be overstated. Implementation of checklists, emergency response simulations and the involvement of multidisciplinary teams improve coordination and patient safety[8]. Institutions that adopt standardized care pathways demonstrate lower rates of maternal morbidity and mortality[14,15].

Conclusion

Anesthesia for cesarean sections in high-risk patients is a complex, multidisciplinary challenge that requires individualized planning, technical expertise and institutional readiness. Neuraxial techniques remain the preferred approach due to their safety profile and benefits for both mother and fetus. However, contraindications or emergencies may necessitate the use of general anesthesia, which should be applied with strict safety protocols and appropriate monitoring. The literature underscores the importance of optimizing hemodynamic stability, preventing hemorrhage and minimizing anesthetic complications through evidence-based strategies. Technological advances, such as ultrasound-guided regional techniques and real-time coagulation monitoring, have enhanced the safety of anesthetic management in these patients. Future directions point to greater integration between anesthesiology, obstetrics and intensive care to create individualized protocols for specific high-risk conditions. Moreover, investments in professional training, emergency drills and adherence to clinical guidelines can significantly improve outcomes. In conclusion, the anesthetic care of high-risk parturient must be proactive, evidence-based and adapted to the realities of each patient. The commitment to safety,

communication and clinical excellence is the foundation for maternal and neonatal survival in complex obstetric scenarios.

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