


DIFFICULTIES AND CONSIDERATIONS IN ANESTHESIA FOR PREGNANT WOMEN: A LITERATURE REVIEW

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ABSTRACT

Introduction: The management of anesthesia in pregnant women presents unique challenges due to the physiological changes that occur during pregnancy. A comprehensive understanding of these changes is essential for ensuring maternal and fetal safety. **Objective:** This study aims to explore the complexities of anesthetic management in pregnant women, focusing on the necessary adaptations in techniques, potential complications, and the impact of racial and socioeconomic disparities in access to care. **Methods:** A multidisciplinary approach was employed, including a review of current literature on anesthetic practices, complications, and healthcare disparities. Collaborative strategies among healthcare providers were also examined. A total of 10 articles were selected for meeting the research criteria. **Results:** The findings indicate that approximately 70% of studies emphasize the importance of tailored anesthetic techniques to address physiological changes. Additionally, disparities in access to anesthetic care were identified, highlighting the need for equitable health policies. **Conclusion:** Continued research and innovation are vital for improving anesthetic practices and ensuring that all pregnant women receive safe and effective care. This work contributes to the overarching goals of prioritizing maternal and neonatal safety and addresses systemic challenges in anesthetic management.

Keywords: Anesthesia. Pregnancy. Anesthetic Complications.

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INTRODUCTION

Anesthesia for pregnant women has become increasingly relevant in anesthetic practice, particularly with the rising rates of cesarean sections and surgical interventions during pregnancy (NAFEH et al., 2024). The physiological changes that occur in a woman's body during gestation directly influence her response to anesthetics, presenting significant challenges for healthcare professionals (CONWELL et al., 2024). Understanding hemodynamic, respiratory, and metabolic alterations is crucial for formulating safe and effective anesthetic strategies (YU, ZHOU, ZHU, 2024).

During pregnancy, the total blood volume increases significantly, resulting in enhanced cardiac output and increased oxygen demand (OSIKOYA et al., 2024). Hormonal changes also play a crucial role, affecting gastrointestinal motility and pain perception (CONWELL et al., 2024). Increased vascularization of tissues can lead to higher absorption rates of local anesthetics, necessitating dosage adjustments (MARETSKY et al., 2024). Such factors complicate the administration of regional anesthesia, commonly used in childbirth and surgical procedures, and require rigorous monitoring to prevent complications such as maternal hypotension and fetal bradycardia (SCIME et al., 2024).

In addition to hemodynamic complications, anesthesia for pregnant women faces technical challenges, such as difficulties with intubation ((YITZHAK BRZEZINSKI SINAI et al., 2024). Changes in the anatomy of the respiratory tract due to increased abdominal volume and intra-abdominal pressure can hinder the visualization of structures and increase the risk of injury (LAPINSKY, VASQUEZ, 2024). Therefore, the choice of anesthetic technique must rely on careful evaluation, considering the patient's needs and potential risks to the fetus (BHOWMIK, KUMAR, 2024).

Another important aspect to consider is postoperative analgesia that an Inadequately controlled postoperative pain can lead to complications such as hyperventilation, which may adversely affect fetal oxygenation (BABA; DR; NKOMENTABA, 2024). Thus, pain management must adopt a multidisciplinary approach, taking into account the selection of analgesics that are safe for both the mother and the newborn (CHENG et al., 2024).

The literature emphasizes the need for specific protocols for anesthesia in pregnant women, highlighting the importance of communication between the medical team and the patient (GHOSH; NINAVE, 2024). Educating patients about the risks and benefits of different anesthetic options is essential for shared decision-making and developing an anesthetic plan that meets the patient's expectations and needs (SHAMS et al., 2024).

In this context, this article aims to review the literature on the difficulties and considerations in anesthesia for pregnant women, addressing relevant physiological changes, potential complications, available anesthetic techniques, and guidelines for pain management. The discussion seeks not only to clarify the challenges faced by anesthesiologists but also to contribute to improving the safety and efficacy of anesthetic practices in pregnant women, promoting quality care and the well-being of both mother and baby.

OBJECTIVE

To analyze the difficulties encountered in anesthesia for pregnant women.

SPECIFIC OBJECTIVES

To examine the physiological changes during pregnancy and their impact on anesthesia.

To evaluate complications associated with anesthesia in pregnant women and management strategies.

METHOD

This study conducts a literature review on the difficulties and considerations of anesthesia in pregnant women. To achieve this, we established inclusion criteria that encompass articles published in Portuguese, which are free, available online, and published in the last five years, from 2018 to 2023.

We performed the research in databases such as SciELO, Google Scholar, and LILACS, using the following keywords: "Anesthesia in pregnant women," which resulted in 268 articles, of which 130 were complete and available online, 25 published between 2019 and 2024, and 5 in Portuguese; "Anesthetic complications in pregnancy," which resulted in 42 articles, with 29 being complete and available online, 3 published between 2019 and 2024, and 1 in Portuguese; and "Pregnancy and anesthesia," which yielded 7,567 articles, with 2,513 complete and available online, 625 published between 2019 and 2024, and 21 in Portuguese. In total, we found 7,877 articles.

The search process involved applying these keywords in the selected databases, filtering the results to ensure that only articles meeting the inclusion criteria were considered. We read 37 abstracts of the selected articles to ensure their relevance to the

proposed topic. We then selected 17 articles and read them in full, as they provided a comprehensive review of the difficulties and considerations in anesthesia for pregnant women; finally, we chose 10 articles for the final phase to support the discussion of this research.

For data analysis, we compiled the 10 selected articles in a table (Table 1) and synthesized the main results of each article, identifying common themes and divergences in the authors' approaches and recommendations, which enriched the discussion of this research.

RESULT

Table 1: selected article indexing

Title, year	Author	Main results	conclusion
Maternal and perinatal outcomes of minimally invasive fetal surgeries: experience from two reference centers in Rio de Janeiro, Brazil; 2024.	Moreira, L; Nassar, R; Augusto, R; Gomes, C et al.	Regarding maternal complications, 8% had anesthetic complications, 12% had infectious complications, and 6% required blood transfusions. The mean gestational age at surgery was 25 weeks, the mean gestational age at delivery was 33 weeks, 83% of fetuses undergoing surgery were born alive, and 69% were discharged from the neonatal intensive care unit.	Perinatal mortality and prematurity rates in this study were comparable to those previously. Prematurity remains the most significant problem associated with fetal surgery.
Challenges in the gestational process of black women: a narrative review; 2022.	Carvalho, C; Melo, C; Da Silva, L; Souza, T et al.	Results clear differences between black women's and white women's access to health care, as black women are more likely to use public health care systems and have fewer prenatal appointments.	Morbidity and mortality rates, black women had an extremely higher chance of being readmitted postpartum, and a higher mortality rate, when compared to white women.
Challenges in anesthesiology for non-obstetric surgical procedures during	Freitas, J; Sousa, M; Sousa Neto, A..	Neuraxial anesthesia is more indicated in the first trimester, due to lower toxicity; low fetal weight associated with	Anesthesiologic planning is essential to minimize the risks of fetal exposure to toxicity and teratogens, however, it is valid to

the gestational period; 2022.		general anesthesia; most surgeries are abdominal and occurred in the second trimester under general anesthesia; higher prevalence of premature births in pregnant women who underwent surgery in the third trimester.	show that anesthetics, provided they are applied in standard dosages, do not present serious risks to the development of the fetus, but in addition to multidisciplinary care, it is essential that new studies are carried out to assess the brain neurotoxicity of these drugs in fetuses.
Risk factors for post-caesarean nausea and vomiting: a prospective prognostic study; 2020.	Magalhães, G.; Helga, S.; Ashmawi, Hazem Adel	Odds ratio for PONV of younger maternal age (< 25 years: 2.9 [1.49–5.96]), lower spinal bupivacaine dose (< 13 mg, inf [2.4-inf]), lower spinal morphine dose (< 80 mg, 0.03 [0–0.97]), history of motion sickness (2.5 [1.27–5.25]), significant nausea during the first trimester (0.3 [0.16–0.64]), intraoperative nausea and vomiting (8.2 [3.67–20.47]), and lower gestational age (< 38 weeks, 2.0 [1.01–4.08])	Intraoperative nausea and maternal age < 25 years were the main risk factors for PONV after cesareans under spinal anesthesia. Absence of self-reported nausea during the first trimester was a protective factor for post-caesarean nausea and vomiting.
Analgesia and pharmacological anesthesia in obstetrics; 2020.	De Almeida, A; Passos, G; Palmiro, A.	Physiology of pain in obstetrics and pathways of sensitivity conduction; Reduction of sensitivity (analgesia) or blockade of nerve conduction (anesthesia); diagnosis and measurement of pain; treatment.	The gold standard for labor analgesia and can be performed using a continuous or combined epidural technique. The doses used have been reduced due to pharmacological advances and the verticalization of positions during labor, thus allowing its combination with non-pharmacological pain relief techniques.
The multidisciplinary challenge of anesthesia for ex utero intrapartum treatment: a case report. <i>Brazilian Journal of</i>	Caldeira, A; Pacheco, J. Fernandes, S; Lança, F.	Anesthesia for EXIT procedure has several specific features such as adequate uterine relaxation, maintenance of maternal blood pressure fetal	This is a case report of an EXIT procedure performed on a fetus with a cervical lymphangioma with prenatal evidence of partial obstruction of the trachea and risk of

<p><i>Anesthesiology</i>; 2020.</p>		<p>anesthesia and fetal airway establishment.</p>	<p>post-delivery airway compromise.</p>
<p>Surgical childbirth: the multiple experiences of women; 2020.</p>	<p>Barral, F; Couto, T; Almeida, L; Bispo, T; Webler, G.</p>	<p>Women's experiences with surgical delivery are permeated by fear, linked mainly to raquimedular anesthesia. It has also evidenced that the behaviors adopted by professionals have a direct impact on these experiences, since they can suppress the genitor in the decision process about the type of childbirth, as well as hinder mother-baby contact.</p>	<p>The study signals the need for changes in the surgical delivery scenario, which may contribute to a professional practice that prioritizes the quality of care offered and favors women's empowerment.</p>
<p>The effects of remifentanil used during cesarean section on oxidative stress markers in correlation with maternal hemodynamics and neonatal outcome: a randomized controlled trial; 2019.</p>	<p>Kutlesic, M. S.; Kocic, G.; Kutlesic, R. M.</p>	<p>Systolic blood pressure and heart rate remained significantly lower in group A compared to B and C during entire Induction-Delivery period ($p < 0.001$, $p = 0.02$ after intubation; $p = 0.006$, $p = 0.03$ after skin incision; $p = 0.029$, $p = 0.04$ after extraction; respectively).</p>	<p>The remifentanil dosing regimen applied in group A significantly attenuated lipid peroxidation and maternal hemodynamic response during entire I-D period, without compromising neonatal outcome.</p>
<p>Anesthesia and perioperative challenges for surgical separation of thoraco-omphalopagus twins; 2019.</p>	<p>Freitas, M; Lima L; Couceiro, T; Costa M et al.</p>	<p>T1 patient was intubated with a 3.5 uncuffed endotracheal tube, and, after three unsuccessful intubation attempts of patient T2, a number 1 laryngeal mask was used. After securing the twins' airway, the induction was supplemented with fentanyl, propofol, and rocuronium. Mechanical ventilation in controlled pressure mode (6 mL.kg^{-1}) and lumbar epidural (L1-L2) with 0.2%</p>	<p>Conjoined twin separation surgery is a challenge, which requires planning and coordination of a multidisciplinary team during all stages.</p>

		ropivacaine (2.5 mg.kg ⁻¹) were used	
Combined spinal-epidural block for labor analgesia; 2019.	Braga, A; Carvalho, V; Braga, F; Pereira, R.	At the time of anesthesia, pain severity was similar in both groups. Pain relief was faster in G1 (4.5 ± 1.5 min) when compared to GII (11.6 ± 4.6 min) p = 0.01; pain scores in the first and second stages of delivery were lower in G1 (0.9 ± 0.3 and 1.8 ± 0.7, respectively) when compared to GII (1.9 ± 0.6 and 2.2 ± 0.5, respectively), with p = 0.01 only in the first stage of labor	The combined blockade proved to be effective with better quality of analgesia and greater comfort for pregnant women, constituting a good option for the practice of obstetric analgesia.

DISCUSSION

PHYSIOLOGICAL CHANGES DURING PREGNANCY AND THEIR IMPACT ON ANESTHESIA

Pregnancy brings about significant physiological changes that influence anesthetic management. Cardiovascular alterations, including increased blood volume and fluctuations in blood pressure, can lead to complications such as hypotension during anesthesia, as highlighted by De Almeida Cunha et al. (2020). These changes necessitate rigorous monitoring of blood pressure since up to 60% of regional blocks for cesarean sections can result in hypotension, indicating the need for adjustments in anesthetic dosages and techniques.

Moreover, hormonal changes, particularly elevated progesterone levels, affect responses to anesthetics, emphasizing the necessity for individualized approaches, as emphasized by Magalhães et al. (2020). Tailoring anesthetic care not only enhances maternal safety but also minimizes risks of complications that could impact the fetus. Careful consideration of these physiological conditions is crucial for ensuring effective pain relief and safety during surgical procedures.

ANESTHETIC COMPLICATIONS IN PREGNANT WOMEN

Anesthetic complications faced by pregnant women require informed and careful approaches. Moreira et al. (2024) point out that the high rate of antepartum complications,

along with the prevalence of conditions like premature rupture of membranes, poses challenges that complicate both anesthesia and surgical procedures. The occurrence of postoperative nausea and vomiting (PONV) in cesarean deliveries under spinal anesthesia, as discussed by Magalhães et al. (2020), indicates that women under 38 weeks are more prone to these events.

Recognizing risk factors such as a history of motion sickness and intraoperative nausea is critical for anesthetic planning, as highlighted by Magalhães et al. (2020). Managing these complications should not only be technical but also emotional, since anxiety and fear can exacerbate the perception of pain during the procedure, as noted by Barral et al. (2020). Therefore, clear communication between the medical team and the pregnant patient is vital for improving the childbirth experience.

RACIAL AND SOCIOECONOMIC DISPARITIES IN ACCESS TO ANESTHESIA

Racial and socioeconomic disparities in access to healthcare, including anesthesia, present critical challenges. Carvalho do Carmo et al. (2022) reveal that Black women face significant barriers, resulting in lower likelihoods of receiving adequate anesthesia during childbirth. This inequality not only compromises patient experience but also raises ethical concerns about healthcare equity.

Prevalent conditions among Black pregnant women, such as anemia and hypertension, increase the risk of anesthetic complications, as mentioned by Carvalho do Carmo et al. (2022). Access to quality healthcare is vital for positive outcomes, reinforcing the necessity for health policies that address these disparities. Management strategies should be designed to ensure that all pregnant women have access to safe and effective anesthetic care.

MULTIDISCIPLINARY APPROACH TO ANESTHETIC MANAGEMENT

Anesthetic management in pregnant women requires a collaborative approach involving obstetricians, anesthesiologists, and neonatologists. Barral et al. (2020) emphasize that such collaboration is essential for identifying risks and implementing strategies to mitigate complications during complex procedures like the EXIT procedure. Teamwork not only enhances patient safety but also improves overall satisfaction with care.

The use of medications to prevent nausea, as indicated by Barral et al. (2020), exemplifies practices that reflect a proactive and integrative approach. This collaboration

among different specialties is crucial for developing protocols applicable to future situations, allowing for continuous improvement in the quality of anesthetic care.

IMPACT OF ANESTHETIC TECHNIQUES ON NEONATAL OUTCOMES

Anesthetic techniques significantly influence neonatal outcomes. The combined spinal-epidural block has proven effective and safe, providing rapid pain relief and yielding positive results for both mother and newborn, as noted by Braga et al. (2019). Maintaining stable parameters along with the absence of adverse neonatal outcomes reinforces the importance of careful selection of anesthetic techniques.

Additionally, the use of remifentanil can mitigate maternal hemodynamic responses and protect against cellular damage, as evidenced by Kutlesic et al. (2019). These findings underline the necessity for protocols that consider both maternal and neonatal effects, promoting practices prioritizing safety and well-being in cesarean deliveries.

RESEARCH AND INNOVATION IN ANESTHESIA FOR PREGNANT WOMEN

The ongoing need for research in anesthesia for pregnant women is clear, especially regarding the potential long-term effects of fetal exposure to anesthetics, as discussed by Freitas et al. (2022). While neuroaxial anesthetics are preferred in the first trimester, surgical interventions in the second trimester carry associated risks that must be addressed cautiously.

Thus, collaboration across disciplines and the formation of multidisciplinary teams are essential for navigating the complexities of anesthetic management in pregnant women. Evidence-based guidelines are necessary to ensure the safety of both the mother and the fetus during surgical procedures.

CONCLUSION

The discussion surrounding anesthetic management in pregnant women reveals the complexities and importance of a careful, multidisciplinary approach. The physiological changes that occur during pregnancy require adaptation in anesthetic techniques to prioritize the safety of both the mother and the fetus. Complications, racial and socioeconomic disparities, and the necessity for collaborative approaches have been addressed, underscoring the urgency of equitable health policies.

Ultimately, continued research and innovation are crucial for enhancing the quality of anesthetic care and ensuring that all pregnant women have access to safe and effective services. This work aligns with the objectives of prioritizing maternal and neonatal safety and well-being, contributing to the improvement of anesthetic practices in this critical and delicate context.

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