Regional anesthesia for urgent upper limb surgery in a pregnant woman with HIV: a case-based insight into multidisciplinary and drug-sparing management

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Abstract

Anesthetic management in pregnant women requiring urgent non-obstetric surgery is particularly challenging in the presence of comorbidities such as HIV and obesity. This report outlines the perioperative approach adopted for a 26-year-old woman at 23 weeks of gestation with AIDS and an elevated body mass index (BMI) undergoing orthopedic surgery following elbow trauma. A supraclavicular brachial plexus block was successfully used for intraoperative anesthesia and postoperative analgesia, thus avoiding systemic medications and minimizing fetal exposure. This case exemplifies how regional anesthesia, combined with coordinated multidisciplinary care, can offer safe and effective management in high-risk pregnancies. Findings support the growing literature favoring individualized, minimally invasive anesthetic strategies, especially in immunocompromised patients.

Introduction

Surgical emergencies during pregnancy represent a complex intersection of maternal and fetal physiology, pharmacology, and risk mitigation. The presence of comorbidities such as HIV/AIDS introduces further layers of complexity, especially in anesthetic decision-making. While general anesthesia has traditionally been the standard in urgent surgical interventions, it is not without considerable risk. Pregnant women, especially those with obesity and immunocompromised states, are at increased risk of respiratory complications, altered drug pharmacokinetics, and negative fetal outcomes due to transplacental drug transfer.[1-4]

Emerging literature and clinical experience suggest that regional anesthesia can be a safer alternative for select surgical procedures during pregnancy.[2] In this report, we present a clinical case managed using supraclavicular brachial plexus block. This technique allowed complete avoidance of systemic sedatives or analgesics during surgery and in the postoperative period. The management strategy aligns with the increasing emphasis on individualized and minimally invasive interventions, particularly in the setting of high maternal and fetal risk.[3,5]

Case Report

A 26-year-old woman, *gravida* 1 *para* 0, at 23 weeks of gestation, presented with an acute left elbow injury following blunt

trauma. Her medical history was significant for HIV/AIDS with a CD4+ T-cell count <150 cells/mm3 and class I obesity (body mass index [BMI]: 32). Preoperative obstetric ultrasonography confirmed fetal viability and normal amniotic fluid volume, with no signs of distress.

Given the patient's immunocompromised state and the potential risks associated with general anesthesia – particularly the increased risk of aspiration, difficult airway management, and perioperative opioid exposure – a regional anesthesia technique was chosen. A supraclavicular brachial plexus block was performed under ultrasound guidance.

The patient was positioned supine with the head turned to the contralateral side. Using a high-frequency linear ultrasound probe, the brachial plexus was identified in the supraclavicular fossa, lateral and superior to the subclavian artery, appearing as a compact cluster of hypoechoic nodules (the "cluster of grapes" sign). After skin antisepsis and local infiltration, a 22-gauge 70 mm insulated needle was advanced using an in-plane approach, targeting the plexus sheath under real-time visualization. Following negative aspiration, a total of 20 mL of local anesthetic was administered, comprising 10 mL of mepivacaine 1% for rapid onset and 10 mL of ropivacaine 0.3% with dexamethasone 4 mg for prolonged duration of action. The spread of the anesthetic around the plexus was visualized, confirming appropriate distribution (Figure 1).

Sensory and motor blockade was achieved within 20 minutes. The surgical procedure lasted 140 minutes and was completed without the need for conversion to general anesthesia or administration of systemic analgesics. During the surgical procedure, the patient was positioned with a left lateral inclination of 15°. To ensure continued postoperative pain control and minimize opioid use, a repeat supraclavicular block with long-acting local anesthetic was performed 24 hours later. The patient remained pain-free until discharge on postoperative day three. Both maternal and fetal conditions remained stable throughout the perioperative period, with no complications observed.[6]

Discussion

This case illustrates the complex interplay of clinical priorities when managing non-obstetric surgical emergencies in pregnant patients, particularly those with significant comorbidities. In this scenario, the patient presented not only with the physiological adaptations of pregnancy but also with the added layers of immunocompromise due to HIV and the anesthetic implications of obesity. Each of these factors, individually significant, collectively heightens the risk profile for both mother and fetus.

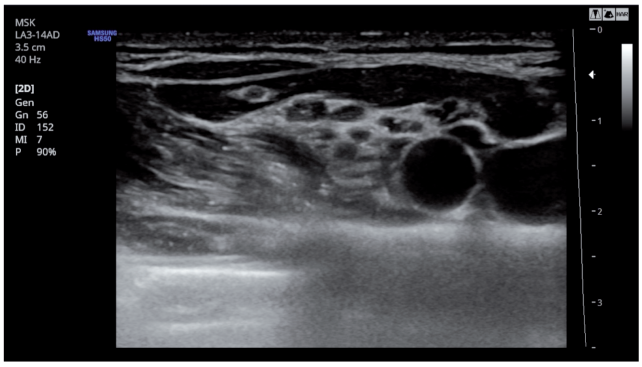

Figure 1. The spread of the anesthetic

The choice of regional anesthesia over general anesthesia was central to the successful outcome in this case. The supraclavicular brachial plexus block provided effective sensory and motor blockade, eliminating the need for systemic sedatives or opioids. This is especially relevant in pregnancy, where transplacental drug transfer can affect fetal neurodevelopment, and in patients with HIV, where polypharmacy and potential interactions with antiretrovirals must be cautiously navigated.[2,3,5] Avoiding general anesthesia also mitigates the risk of difficult airway management, aspiration, and postoperative pulmonary complications, which are elevated in obese pregnant patients.[1,4]

Beyond anesthetic technique, this case underscores the importance of a multidisciplinary approach. Close collaboration between obstetrics, anesthesia, orthopedics, and infectious disease ensured comprehensive care that accounted for all facets of the patient's condition. Fetal well-being was monitored throughout, with obstetric ultrasound playing a vital role pre- and postoperatively. This continuous monitoring ensures prompt intervention in case of fetal distress.[6] Although the situation was complex, our approach enabled us to maintain maternal well-being, as reflected by the stability of the patient's clinical parameters, which consequently assured fetal well-being. In the event of fetal distress, a team of obstetricians and neonatologists – previously briefed on the case – was on standby to perform an emergency cesarean delivery should there be no response to pharmacologic management. This case report further highlights the necessity of a multidisciplinary team approach to ensure both safety and the application of appropriate expertise. It is important to note that the initial approach prioritized a conservative pharmacologic strategy, taking into account the gestational age.

The immunosuppressive effects of advanced HIV, particularly in a pregnant patient, necessitate enhanced perioperative vigilance. With a CD4 count below 150, the patient was at heightened risk for infection, and the avoidance of systemic opioids or sedatives likely reduced the incidence of nosocomial or respiratory complications. These concerns echo findings from the World Association of Perinatal Medicine (WAPM) Working Group, which highlighted that systemic illness and pharmacologic exposure are strongly correlated with poorer maternal and perinatal outcomes during infections such as COVID-19.[7,8]

Looking forward, it is essential to address the long-term follow-up of the maternal-fetal dyad, especially in high-risk scenarios such as the one presented. Neonates exposed in utero to both antiretroviral therapy and anesthetic agents – even in the context of regional anesthesia – should undergo structured monitoring to assess neurodevelopmental progress, somatic growth, and potential HIV seroconversion. A multidisciplinary follow-up involving pediatric, neurologic, and infectious disease specialists is recommended during the months and years following birth to ensure optimal psychophysical development and to detect complications early.

Moreover, the pharmacologic interplay between antiretroviral therapy and anesthetic agents must not be underestimated. While regional anesthesia reduces systemic drug exposure, interactions remain possible. Protease inhibitors, for instance, can inhibit hepatic cytochrome P450 enzymes, potentially increasing the risk of local anesthetic systemic toxicity. Careful selection of anesthetic agents, including any adjuvants, is crucial to avoid adverse synergistic effects and ensure patient safety in cases of polypharmacy.

Infectious prophylaxis also warrants specific consideration. For immunocompromised individuals with CD4 counts below 200, such as in this case, perioperative strategies must exceed standard surgical antibiotic prophylaxis. Trimethoprim-sulfamethoxazole is advised for the prevention of opportunistic infections like *Pneumocystis jirovecii* pneumonia, and in selected cases, antifungal or antiviral agents may be added. Close coordination with infectious

disease specialists is vital in perioperative planning, as is strict adherence to aseptic protocols and environmental control measures in the operating room to minimize the risk of nosocomial infections in this particularly vulnerable patient population.

This case also reflects the evolving understanding of obstetric anesthesia, where the role of regional blocks is increasingly recognized not only as an alternative but often as a superior modality for specific surgeries. As highlighted by Tascón Padrón *et al.*, ultrasound-guided nerve blocks offer precise, reproducible, and safe anesthetic solutions, especially in delicate maternal conditions, including the addition of adjuvants to the anesthetic formulation.[3,9,10]

In summary, the intersection of pregnancy, HIV, and trauma surgery created a complex clinical picture. The drug-sparing, targeted approach of regional anesthesia provided a tailored solution that prioritized maternal safety and fetal protection. Such cases advocate for the integration of evolving regional techniques and multidisciplinary cooperation into mainstream obstetric anesthetic practice.

Conclusions

Regional anesthesia, particularly the supraclavicular brachial plexus block, is a safe and effective approach in immunocompromised pregnant women requiring upper limb surgery. Drug-sparing strategies should be prioritized, and management should always involve a multidisciplinary team.

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