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CASE REPORT

Cesarean section in a patient with body mass index > 80 kg/m²: a case report highlighting the clinical challenges

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ABSTRACT

Obesity is a public health concern due to several coexisting conditions like hypertension, diabetes, and pulmonary and cardiovascular limitations. Anesthetic challenges are increased in obese patients, mainly during pregnancy. We report a case of a super obese patient scheduled for elective cesarean section. Spinal anesthesia was performed and went uneventful. Several issues were under concern: difficult venous access and spinal puncture; severe hypotension; difficult airway access; and the need for extra personnel for management. This is a rare and challenging situation for anesthesiologists that requires extra care for successful maternal and fetal outcomes.

KEYWORDS

Cesarean section; morbid obesity; spinal anesthesia

INTRODUCTION

Published data on anesthetic management of morbidly obese parturients during delivery remain scarce, particularly for individuals with a body mass index (BMI) exceeding 80 kg/m². The existing literature primarily consists of isolated case reports, including a small case series of three patients with BMIs ranging from 73 to 95 kg/m²[1], and individual reports detailing patients with BMIs of 73, 76, and 112 kg/m²[2-4]. These limited reports highlight the absence of standardized anesthetic and surgical approaches. While most of these patients underwent cesarean section under neuraxial anesthesia, at least one patient with a BMI of 109 kg/m² required general anesthesia[5]. This variability underscores the lack of established guidelines for managing obstetric patients with extreme obesity.

Due to the rarity of such presentations, dedicated literature addressing the unique anesthetic considerations for obstetric patients with extreme obesity is notably lacking.

Herein, we present a case of a morbidly obese parturient presenting for delivery, and discuss the associated anesthetic, obstetric, and logistical challenges encountered.

CASE REPORT

With institutional ethics approval, the patient's written informed consent, and according to ACRE/CARE guidelines, we present the case of a 29-year-old

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parturient weighing 223 kg, 165 cm height and BMI equal to 81.9 kg/m^2, primigravida and 38 weeks/1 day pregnant, and not in labor. Her medical history was notable for hypothyroidism, while her mobility was limited, and she experienced obesity-related shortness of breath, which had not worsened during pregnancy. Gestational diabetes and hypertension were also reported. She was in use of levothyroxine, 50 µg/day, and was under dietician supervision during the pregnancy. Throughout the antenatal period, the patient exhibited normotensive blood pressure and negative screening results for pre-eclampsia.

Her airway anatomy was unremarkable, categorized as Mallampati class I, with normal neck extension and thyromental distance. Cardiac auscultation showed normal and rhythmic heart sounds and a heart rate equal to 90 beats/min.

Laboratorial screening showed hemoglobin = 11.5 g/dl, platelet count = 241,000, creatinine = 0.54 mg/dl, blood urea nitrogen = 23 mg/dl, and normal coagulation tests.

Reliable fetal cardiotocography monitoring was hindered by her abdominal panniculus, prompting the decision to do a cesarean section after a multidisciplinary meeting and a detailed clarification of the risks to the patient.

Transfer of the patient to the operating table required the assistance of several staff members. Once positioned, the placement of two 18-gauge peripheral intravenous catheters was easily accomplished, and lactated Ringer's solution was administered, initially at 6 ml/kg/h (total volume = 2,250 ml) according to her total body weight.

An appropriate blood pressure cuff (Philips Healthcare M1576A pressure cuff), which measures the noninvasive blood pressure for an adult limb circumference of 42 to 54 cm, was placed on her arm, and substantial padding was necessary on the arm boards to maintain her arms at a comfortable height. The bed was tilted left to achieve uterine displacement, and she was secured at the operating table with a folded bed sheet and medical tape applied to her legs. She was also monitored with continuous five-lead electrocardiogram and pulse oximeter, and oxygen was offered via a nasal catheter. Initial blood pressure and heart rate were 170/110 mmHg and 95 beats/min, respectively.

Additional personnel helped her to be in a partial flexed sitting posture for the neuraxial puncture (Figure 1). We identified the L_4-L_5 lumbar interspace through manual palpation, and a 25-gauge 90-mm Quincke needle was advanced into the subarachnoid space after two attempts. Following the appearance of cerebrospinal fluid at the needle hub, 60 µg of morphine combined with 17 mg of hyperbaric bupivacaine (3.4 ml of a 0.5% solution) was injected into the subarachnoid space, the patient was placed in horizontal decubitus and left manual uterine displacement was provided. The sensory level was assessed by pinprick until a level of T_4 was

Figure 1. Patient positioning for the neuraxial puncture with patient's back view.

confirmed. Then, a 20–30º upper trunk inclined position was set to perform the surgery.

Systolic blood pressure values below 95 mmHg were treated with metaraminol, doses of 1 mg, totaling 4 mg during the procedure. Lowest values of heart hate were 70 beats per minute and no treatment was required.

To perform the Pfannenstiel incision and to displace the panniculus laterally to the umbilicus and downward, large medical tapes were employed to secure the large flap of excess skin and fat, thereby exposing the surgical site adequately (Figure 2).

Difficult airway equipment, including a video laryngoscope and a ramped intubation pillow, was readily available to ensure preparedness for emergency intubation or general anesthesia in the event of respiratory failure or a failed neuraxial block.

The surgery proceeded without complications, with an estimated blood loss of 800 ml. A female child was born weighing 4.015 g, 15 minutes after the surgery had begun, with Apgar score 9 and 10, in the 1st and 5th minutes. The whole procedure lasted 60 minutes. An infusion of 100 ml of 0.9% normal saline containing 10 IU of oxytocin was initiated, followed by an additional 500 ml of 0.9% normal saline with 20 IU of oxytocin over two hours. Additional medications used were omeprazole, 40 mg; cefazolin, 3 g; dexamethasone, 10 mg; ondansetron, 8 mg; dimenhydrinate, 30 mg; metamizole, 2 g; and ketoprofen, 100 mg.

The patient remained monitored in the postanesthesia care unit until the spinal block had completely recovered. The patient and baby were released home five days after the delivery. She received prophylactic treatment with enoxaparin, 120 mg, subcutaneously, once a day for 10 days, and with acetylcefuroxime, 500 mg, orally, three times a day for 7 days after delivery. She was advised to attend postpartum consultations in her hometown.

DISCUSSION

Reports of obese parturients undergoing vaginal labor or cesarean section are not uncommon but reports of such patients presenting BMI > 80 kg/m^2 are very rare. Obesity during pregnancy poses numerous challenges for anesthetic management. Issues such as

Figure 2. Detail of the large medical tape employed to secure the large flap of excess skin and fat, to expose the surgical site adequately.

venous access, both invasive and non invasive arterial pressure monitoring, and the administration of regional anesthesia may face increased difficulty. Additionally, pregnancy is recognized as a significant risk factor for difficult intubation, with studies indicating that up to 33% of morbidly obese parturients may experience this complication. Obese pregnant patients also have increased gastric volumes that may be proportional to their BMI, which significantly elevates the risk of aspiration during general anesthesia[6].

Vaginal delivery, initially considered, was ultimately deemed to present a nebulous yet unacceptable risk to the neonate. Obstetricians faced challenges during vaginal examination due to the patient's thigh size and limited leg abduction, raising concerns about the feasibility of assisted delivery and effective cardiotocography.

Effective fetal monitoring in obese pregnancies requires a comprehensive strategy due to challenges posed by maternal body habitus. Noninvasive external fetal monitoring, using transducers to assess fetal heart rate and uterine contractions, often does not provide adequate tracings. This necessitates adjustments such as transducer repositioning, tocolytic administration, and maternal repositioning. When external monitoring proves insufficient, internal fetal monitoring, with a fetal scalp electrode and/or an intrauterine pressure catheter, offers more precise data, as supported by The American College of Obstetricians and Gynecologists[7], albeit with inherent risks of infection and fetal injury. Regular ultrasound assessments, incorporating biophysical profile scoring and Doppler studies of the umbilical artery[8], are crucial for evaluating fetal growth, amniotic fluid volume, placental function, and overall fetal well-being, complementing heart rate monitoring. Antepartum fetal heart rate testing aims to identify at-risk fetuses, but interpretation can be difficult in obese women[9]. In Brazil, while external fetal monitoring is generally accessible, the availability of internal fetal monitoring, particularly intrauterine pressure catheter and advanced Doppler studies may be limited in some hospitals due to resource constraints and lack of trained personnel.

The anesthetic team's primary concern was centered on the potential inability to provide prompt and safe anesthesia should complications arise during vaginal delivery. We also emphasized the potential for a difficult, time-consuming, or even unfeasible spinal puncture.

Cesarean section was performed at a facility with an on-site intensive care unit, given the potential for peripartum complications. The facility was equipped with specialized bariatric equipment, including an appropriately sized operating table and stretchers.

Although arterial cannulation was initially considered due to potential challenges with non invasive blood pressure monitoring and hemorrhage risk, the oscillometric method proved feasible and was selected to prioritize the patient's comfort. The reliability of oscillometric measurements in morbidly obese pregnant women is nuanced. While convenient, their accuracy is affected by multiple factors. Oscillometric devices may overestimate blood pressure compared to auscultatory or intra-arterial methods, especially at higher ranges[10], possibly due to increased arterial wall stiffness common in obesity and pregnancy. Pre-eclampsia can further alter vascular tone and reactivity, potentially impacting oscillometric readings. Studies comparing oscillometric readings to auscultatory or invasive measurements have shown variable agreement, with discrepancies at higher blood pressure levels[11-12].

Neuraxial anesthesia is generally favored for cesarean delivery due to the risks associated with general anesthesia[13]. Spinal, epidural, and combined spinal-epidural techniques have been successfully employed in obese parturients. Continuous techniques may benefit patients with elevated BMI, facilitating neuraxial block extension. However, they carry an increased risk of multiple insertion attempts, accidental dural puncture, and epidural vein cannulation during catheter placement. In this case, while spinal anesthesia is typically associated with a time-limited block, it was chosen for its relative easiness of execution and low failure rate in our practice. A higher bupivacaine dose (17 mg) was used, aiming to reduce the chances of failure or inadequate anesthesia level or duration. The utilization of intrathecal morphine for analgesia in obstetrics, particularly in patients with morbid obesity, requires a rigorous risk-benefit analysis. Intrathecal morphine offers breakthrough pain relief with potentially light systemic side effects[14], but obesity can influence the pharmacokinetics and pharmacodynamics of drugs administered systemically and in the spinal cord, via epidural and subarachnoid, increasing the incidence of side effects[15,16].

A meta-analysis by Sultan and collaborators evaluated the effects of intrathecal morphine on outcomes following elective cesarean section, comparing low doses (50–100 µg) with higher doses (> 100–250 µg), indicating that the higher doses prolong postoperative analgesia but result in higher incidence of nausea or vomiting and pruritus[17]. Despite the benefits of higher doses on the duration of analgesia, it is essential to consider the increased risk of maternal side effects. The addition of fentanyl may enhance the analgesic effect and potentially reduce the required morphine dose, although it also carries additional risks[18]. Our choice was based on the patient's habitus and risk factors. While higher doses of intrathecal morphine could have prolonged analgesia following the cesarean section, it could have increased risk of pruritus, vomiting, and of delayed respiratory depression[19].

The choice of single-shot spinal anesthesia is noteworthy, as it contrasts with practices in many hospitals worldwide. A retrospective study involving nearly 400 parturients undergoing elective cesarean deliveries found that spinal anesthesia was predominantly used for patients with a BMI below 50 kg/m^2, while it was entirely absent in patients with a BMI of 60 kg/m^2 or higher[20].

Limited research informs optimal neuraxial anesthetic dosing, including adjuvants such as hydrophilic and lipophilic opioids, via epidural and subarachnoid, in these patients. Evidence regarding the longitudinal spread of neuraxial anesthesia in pregnancy and obese patients remains inconsistent due to the absence of reliable quantitative measures of solution dispersion within the subarachnoid and epidural spaces.

Increased operative duration and blood loss were anticipated, attributable to the elevated BMI, a known risk factor for postpartum hemorrhage[21]. Oxytocin is the first-line uterotonic agent for postpartum uterine atony. Clinical practices vary considerably regarding optimal oxytocin dosing and infusion rates during cesarean section, commonly involving continuous infusions of 20 to 40 IU[22].

Morbid obesity presents unique challenges for postpartum women, significantly elevating the risk of surgical site infections. This heightened risk is multifaceted, stemming from impaired angiogenesis and collagen synthesis, which delays wound healing and increases vulnerability to infection, as noted by Pierpont and collaborators[23]. Furthermore, abundant subcutaneous adipose tissue, characterized by poor vascularization, creates an environment conducive to bacterial proliferation while impeding antibiotic efficacy. Obesity-related chronic low-grade inflammation and compromised immune cell function exacerbate susceptibility to infection. Comorbidities such as diabetes, common in morbidly obese women, further hinder wound healing and increase infection risk. Acetylcefuroxime, with its broad-spectrum antibacterial properties and ability to achieve adequate tissue concentrations, offers a potential strategy to mitigate these challenges and reduce the incidence of surgical site infection in this population. Direct evidence specifically evaluating acetylcefuroxime for such infections in morbidly obese postpartum women may be limited. However, substantial literature supports the use of cefuroxime and other cephalosporins for surgical prophylaxis in various procedures[24]. Combined with other evidence-based strategies, acetylcefuroxime was chosen to be maintained during the postoperative period as suggested by the infectious disease team.

This case underscores the considerations unique to parturients with very high BMI, including the verification of operating table and gurney weight limits, the need for a larger staff than typically required for patient transfer and positioning, the choice of the anesthetic technique and possible drugs and doses, the postpartum respiratory monitoring and careful and multidisciplinary planning. The insights gained from this case can serve as a valuable guide for healthcare professionals.

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