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CASE REPORT

Epidural Anesthesia as a Primary Technique for Emergency Cesarean Delivery in a Morbidly Obese Parturient

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Abstract

Morbid obesity in parturients presents a constellation of anesthetic challenges, including difficult airway, increased aspiration risk, and technical difficulties with neuraxial techniques. We report the case of a 38-year-old woman (estimated weight 120 kg, body mass index [BMI] approximately 44 kg/m²), gravida 3, para 2, admitted to the obstetric emergency unit in active labor with a doubly scarred uterus (two prior cesarean sections) and a full stomach following a copious meal ingested less than one hour prior to presentation. Multiple attempts at subarachnoid block using both standard and bariatric-length spinal needles were unsuccessful. In view of the dual threats of pulmonary aspiration and difficult tracheal intubation—each compounded by morbid obesity and the full-stomach state—general anesthesia was deemed high risk and avoided. A de novo epidural catheter was subsequently placed and incrementally dosed to achieve a T4 dermatomal level adequate for cesarean delivery. The procedure was completed without complication, with delivery of a healthy neonate. This case underscores the value of epidural anesthesia as a viable and potentially life-saving primary anesthetic strategy for cesarean delivery when spinal anesthesia fails in the morbidly obese parturient with a full stomach.

Keywords

morbid obesity, Obstetric anesthesia, Epidural anesthesia, Cesarean section, Failed spinal, Aspiration risk, Difficult airway, Doubly scarred uterus

Introduction

Morbid obesity, defined as a body mass index (BMI) ≥ 40 kg/m², has emerged as one of the most significant challenges in contemporary obstetric anesthesia. Its prevalence in reproductive-age women has risen

dramatically over the past two decades, and this upward trend is mirrored in obstetric populations worldwide [1]. In many high-income countries, morbid obesity now complicates 5-8% of all pregnancies, while rates in middle- and lower-income countries are also rising in parallel with broader epidemiological transitions [2].

The morbidly obese parturient carries a substantially elevated perioperative risk compared to her non-obese counterpart. She faces a higher incidence of obstetric complications—including gestational diabetes, preeclampsia, macrosomia, and cesarean delivery—as well as anesthetic complications that include difficult or failed tracheal intubation, heightened susceptibility to pulmonary aspiration, and increased technical difficulty with neuraxial procedures [3,4]. Regional anesthesia, particularly spinal anesthesia (subarachnoid block), is the preferred technique for elective and emergency cesarean delivery because it avoids the risks inherent to airway management. However, in the morbidly obese, the very anatomical distortions that increase airway risk also complicate neuraxial access, resulting in a higher rate of failed or technically challenging spinal placement [5].

The situation is further complicated when additional risk factors converge: a full stomach markedly elevates the danger of Mendelson's syndrome should general anesthesia become necessary; a scarred uterus mandates cesarean delivery; and extreme obesity confounds every anesthetic modality. This unique intersection of risk factors demands a thoughtful, individualized anesthetic plan that prioritizes patient safety above procedural convenience.



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We present a case in which all three high-risk features co-existed: morbid obesity (120 kg, BMI ~44 kg/m²), a doubly scarred uterus in active labor, and a full stomach with a recent copious meal. Following multiple failed spinal attempts with both standard and extended bariatric needles, a de novo epidural catheter was placed and successfully employed as the primary anesthetic for emergency cesarean delivery—a technique sometimes referred to as 'primary epidural anesthesia for cesarean section.' This report describes the anesthetic management in detail and reviews the relevant literature to provide guidance for clinicians confronted with similar challenges.

Background

Obesity in obstetric anesthesia

The World Health Organization classifies obesity by BMI: Class I (30-34.9), Class II (35-39.9), and Class III (≥ 40 kg/m²), the latter corresponding to morbid obesity. Pregnancy superimposes major physiological changes—increased oxygen consumption, reduced functional residual capacity (FRC), accelerated gastric emptying impairment, aortocaval compression, and mucosal airway edema—that are amplified in the presence of morbid obesity [6]. The combined effect of gravid uterus and excess adiposity causes a further reduction in FRC by up to 50%, resulting in rapid oxygen desaturation during apnea, a critically important consideration should intubation be required.

From an airway standpoint, morbid obesity is associated with excess soft tissue in the neck and pharynx, reduced mouth opening, short neck, high Mallampati score, and limited atlanto-occipital extension. These features, in conjunction with the pregnancy-related airway changes, nearly double the risk of failed intubation compared with the general surgical population—reported at approximately 1:224 in obstetric patients versus 1:2,230 in the general population [7]. The threat of 'cannot intubate, cannot oxygenate' scenarios is therefore substantially elevated.

Aspiration risk and Mendelson's syndrome

Pulmonary aspiration of gastric contents—Mendelson's syndrome—remains a leading cause of anesthetic-related maternal mortality [8]. Obesity impairs lower esophageal sphincter tone, increases gastric acid secretion, and slows gastric emptying. A full stomach at the time of anesthesia, defined as a meal ingested within 6-8 hours of elective procedures (or at any time in the emergency setting), constitutes a critical additional risk factor. In the parturient described herein, the ingestion of a copious meal less than one hour prior to presentation created a situation in which gastric contents were abundant, highly acidic, and at high volume—making aspiration under general anesthesia an immediately life-threatening prospect [9].

Standard prophylactic measures against aspiration include sodium citrate administration, H₂-receptor antagonism (e.g., ranitidine), proton pump inhibitors, and metoclopramide. However, in the setting of emergency surgery, full prophylaxis may be incomplete. Avoidance of general anesthesia altogether—when feasible—therefore represents the most effective strategy.

Challenges of neuraxial anesthesia in morbid obesity

Spinal anesthesia (intrathecal block) is the gold standard for cesarean delivery because of its rapidity, reliability, depth of block, and favorable maternal-fetal pharmacodynamic profile. However, morbid obesity substantially increases the technical difficulty of spinal placement. The lumbar spinous processes are buried under thick subcutaneous adipose tissue, surface landmarks are often impalpable, and the sitting or lateral positioning required for neuraxial access is frequently compromised by body habitus, patient discomfort, and labor pain [5,10].

Moreover, magnetic resonance imaging studies have demonstrated a reduced lumbar cerebrospinal fluid (CSF) volume in obese patients, along with epidural venous engorgement that narrows the subarachnoid space. These factors increase the rate of failed dural puncture, dry tap, or inadvertent subdural placement. Literature reports suggest that ≥ 3 puncture attempts occur in approximately 9% of obese obstetric patients versus 5% in non-obese patients, and the overall failure rate of spinal anesthesia is significantly higher with rising BMI [5].

Standard spinal needles (90 mm) are often insufficient to traverse the deep adipose tissue and reach the subarachnoid space in morbidly obese patients; extended needles (120-150 mm) are frequently required but may still be unsuccessful. The combined spinal-epidural (CSE) technique has been advocated in this population as it confers the technical advantages of a guiding epidural needle while allowing intrathecal drug administration, with the epidural catheter serving as a safety net for block extension or supplementation [11].

Epidural anesthesia as primary technique for cesarean delivery

While the conversion of a pre-existing labor epidural to surgical anesthesia for cesarean delivery is well established [12], the use of a de novo (freshly placed) epidural catheter as the sole primary anesthetic for cesarean section is less commonly described. This 'pure epidural' technique for cesarean delivery involves incremental dosing through the epidural catheter to achieve a sufficiently dense and cephalad block (T₄ dermatomal level) for surgery. It requires higher volumes of local anesthetic than spinal anesthesia and

a longer onset time (15-30 minutes versus 3-5 minutes), but offers important advantages: the incremental nature of administration permits titration and reduces the risk of total spinal anesthesia; the catheter can be supplemented if the block is inadequate; and-critically-it avoids the need for general anesthesia in patients for whom airway management carries exceptional risk [13,14].

Case Report

A 38-year-old woman (estimated weight 120 kg, height 165 cm, BMI 44.1 kg/m²), gravida 3, para 2, presented to the obstetric emergency unit at 38 weeks gestation in active spontaneous labor. Her obstetric history was notable for two prior lower-segment cesarean sections (doubly scarred uterus), and her current pregnancy had been complicated by gestational diabetes mellitus managed with dietary measures alone. On further history, the patient reported having consumed a large meal (a full dinner with multiple courses) approximately 40-50 minutes prior to presentation-a critical finding that was documented immediately.

On physical examination, the patient was distressed from uterine contractions. Vital signs on admission were: blood pressure 138/88 mmHg, heart rate 102 beats per minute, oxygen saturation 96% on room air, and respiratory rate 20 breaths per minute. Airway assessment revealed Mallampati class III, limited mouth opening (approximately 3.5 cm inter-incisor distance), a short, thick neck with reduced atlanto-occipital extension, and prominent breast tissue. Thyromental distance was estimated at 4.5 cm. These findings collectively placed the patient in a high-risk category for difficult tracheal intubation. Lumbar examination showed no palpable spinous processes; landmarks were entirely obscured by adipose tissue.

Emergency laboratory investigations including full blood count, coagulation screen, urea and electrolytes, and cross-matching were obtained and found to be within acceptable limits (hemoglobin 11.2 g/dL, platelet count $187 \times 10^9/L$, INR 1.1). Fetal cardiotocography demonstrated a category II tracing with variable decelerations, necessitating urgent delivery. Rapid-sequence aspiration prophylaxis was administered: sodium citrate 30 mL orally, ranitidine 150 mg intravenously, and metoclopramide 10 mg intravenously.

Given the indication for urgent cesarean delivery (doubly scarred uterus in active labor with non-reassuring fetal status), the anesthetic team proceeded to neuraxial assessment. The patient was placed in the sitting position with assistance from two nurses. Three attempts at subarachnoid block were made by a senior consultant anesthesiologist, first using a standard 25-gauge Whitacre pencil-point spinal needle (90 mm), and subsequently using an extended 25-gauge bariatric

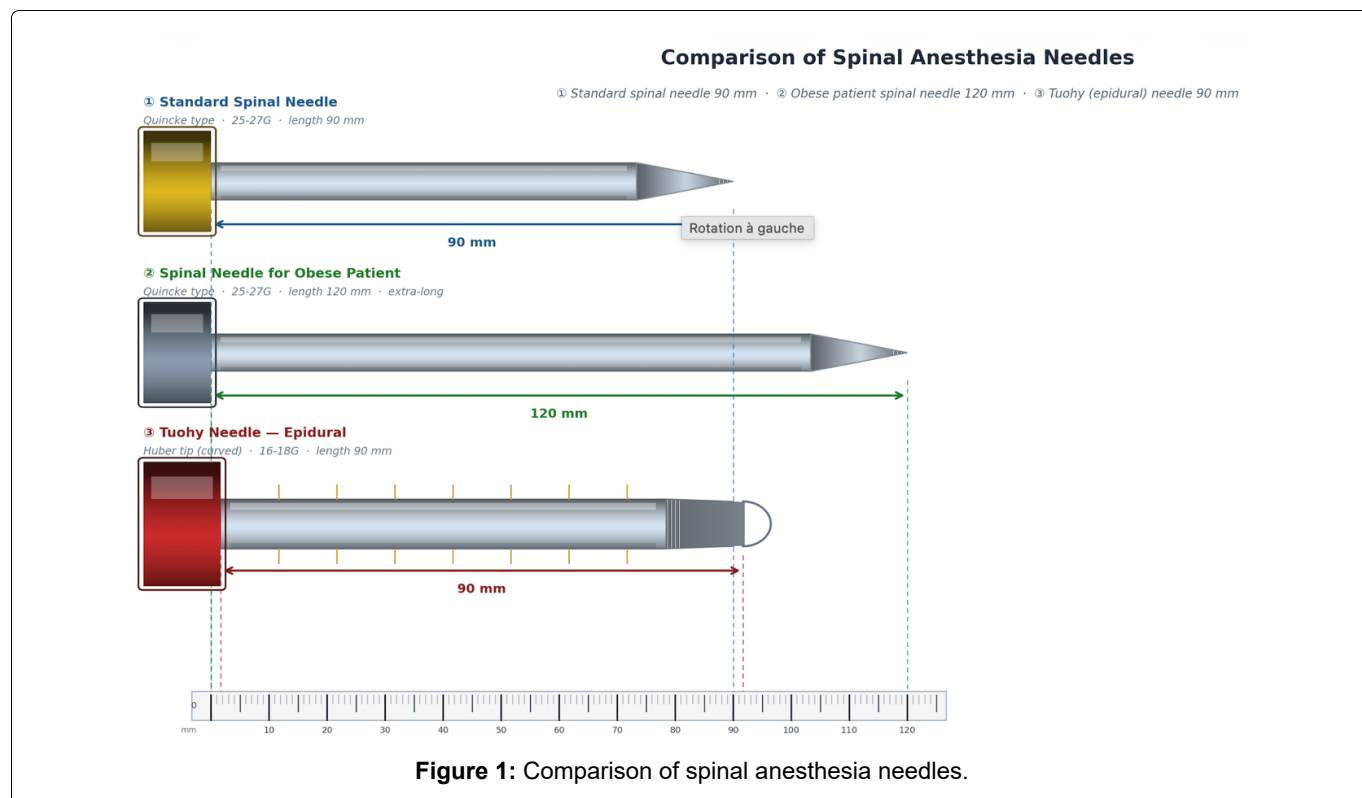
spinal needle (120 mm). Despite multiple-level attempts (L2-L3, L3-L4, and L4-L5), no free-flowing cerebrospinal fluid could be aspirated, and all attempts were abandoned. The estimated skin-to-intrathecal depth, calculated from operator experience and estimated body habitus, exceeded the reach of the available needles without providing confident confirmation of subarachnoid placement.

A multidisciplinary discussion was convened at the bedside between the obstetric anesthesiologist, attending obstetrician, and theater team. General anesthesia was assessed as carrying prohibitive risk given the following converging factors: (1) predicted difficult tracheal intubation based on clinical airway assessment; (2) very high aspiration risk due to full stomach with copious recent meal and morbid obesity-related gastroparesis; (3) rapid oxygen desaturation anticipated due to reduced functional residual capacity from both pregnancy and morbid obesity. After weighing all options, the decision was made to proceed with epidural anesthesia as the primary anesthetic technique.

Epidural catheter placement was performed with the patient in the left lateral decubitus position, which was better tolerated than sitting given her discomfort and obesity. The L3-L4 interspace was identified by ultrasound-assisted surface marking (using a handheld linear probe to estimate depth and locate the interlaminar space). An 18-gauge Tuohy needle was advanced using the paramedian approach with loss-of-resistance to saline technique. The epidural space was identified at a depth of 9 cm from the skin surface. A multi-orifice epidural catheter was inserted and advanced so that 5 cm remained within the epidural space. Aspiration testing revealed neither blood nor CSF. An epidural test dose was administered: 3 mL of 2% lidocaine with 1:200,000 epinephrine. No signs of intravascular injection (tachycardia, palpitations) or subarachnoid injection (rapid dense motor block) were observed over 3 minutes. (Figure 1).

Incremental dosing was then commenced. A total volume of 20 mL of 2% lidocaine with 1:200,000 epinephrine buffered with sodium bicarbonate (0.1 mEq/mL) was administered in 5 mL aliquots at 3-minute intervals, with aspiration and blood pressure monitoring between each bolus. The patient remained hemodynamically stable throughout, with a nadir systolic blood pressure of 102 mmHg, managed with phenylephrine infusion 50 mcg/min and a 500 mL crystalloid co-load. Fentanyl 50 mcg was added epidurally to improve the quality of the block and reduce local anesthetic requirements.

Dermatome testing with ice was performed sequentially. A T4 sensory level was achieved bilaterally within 22 minutes of initiating the epidural load. Motor block was assessed using the modified Bromage scale,



with the patient scoring grade 3 (unable to flex the knee or ankle) bilaterally. The patient was positioned with left uterine displacement. The surgical team confirmed surgical anesthesia by loss of pinprick sensation at T4 and absence of motor function in the lower extremities.

Emergency lower-segment cesarean section was performed without complication. Surgical duration was 48 minutes. A male neonate was delivered in good condition, with Apgar scores of 8 at one minute and 9 at five minutes. Umbilical cord arterial pH was 7.28. Estimated blood loss was 700 mL, managed with oxytocin infusion and intravenous fluid replacement. No intraoperative supplementation was required through the epidural catheter, and no conversion to general anesthesia was necessary.

Postoperatively, the patient was monitored in the high-dependency unit for 24 hours. The epidural catheter was retained and used for postoperative analgesia with a continuous epidural infusion of 0.1% bupivacaine with fentanyl 2 mcg/mL for 24 hours, supplemented by scheduled paracetamol 1 g four times daily and diclofenac 75 mg twice daily (after obstetric clearance). The patient was mobilized on postoperative day 1 and discharged home on postoperative day 5 with no neurological sequelae, no respiratory complications, and no evidence of wound infection. The neonate remained healthy throughout the hospital stay and was breastfeeding successfully at discharge.

Discussion

This case illustrates a rare but clinically important scenario: the convergence of morbid obesity, full stomach, and doubly scarred uterus in an emergency

parturient, resulting in failed spinal anesthesia and necessitating an alternative strategy that avoided general anesthesia. The decision to employ epidural anesthesia as a de novo primary technique was driven by a careful, real-time risk-benefit analysis, and the favorable outcome validates this approach.

The failure of spinal anesthesia in this case is consistent with published data. Obesity is an independent predictor of both technical difficulty and failure of neuraxial block in obstetric patients, with failed spinal rates rising significantly in patients with BMI >40 kg/m² [5,15]. In our case, all three standard interspaces were attempted with two different needle lengths, without successful CSF aspiration. The combination of deep soft tissue, inability to palpate landmarks, and the physiologically reduced lumbar CSF volume in obesity—as demonstrated by MRI studies—likely contributed to this failure [5]. The use of ultrasound-guided neuraxial placement might have improved the probability of success with either spinal or epidural techniques, and this represents an important procedural lesson: in morbidly obese parturients, ultrasound guidance should be considered early in neuraxial attempts rather than as a rescue measure [15].

The avoidance of general anesthesia in this case was a deliberate and defensible clinical decision. The risks of GA in a parturient with morbid obesity and a full stomach are well established. The obstetric airway is inherently more difficult than the non-obstetric airway due to breast hypertrophy, pregnancy-induced mucosal edema, decreased FRC, and physiological changes that accelerate desaturation [7]. Morbid obesity superimposes further difficulty through excess

pharyngeal soft tissue, high Mallampati scores, and limited neck mobility-all present in our patient. The risk of failed intubation in this population is estimated to be as high as 1:30 in some series [7]. More critically, the full stomach created an immediate risk of aspiration pneumonitis should supraglottic regurgitation occur during induction or bag-mask ventilation. The Mendelson's syndrome that can result carries a mortality of up to 5% even with maximal supportive care [8,9].

The choice of epidural over a re-attempted spinal or CSE technique was influenced by several considerations. Re-attempting a standard spinal after three failed attempts carries the risk of post-dural puncture headache from previous attempts, cumulative patient distress, and ongoing fetal deterioration. A CSE technique, while theoretically ideal in this setting-combining the safety net of the epidural catheter with intrathecal drug action-would still require a successful dural puncture that had already proved elusive [11]. The paramedian epidural approach using a large-bore Tuohy needle, guided by ultrasound surface marking, was more likely to succeed given the greater surface area of the target (epidural space vs. subarachnoid space) and the suitability of the loss-of-resistance technique for identifying the epidural space even without CSF confirmation [13].

The pharmacological regimen used-2% lidocaine with epinephrine buffered with sodium bicarbonate, supplemented with epidural fentanyl-reflects established best practice for de novo epidural anesthesia for cesarean section. Lidocaine 2% provides rapid onset (approximately 15-20 minutes to T4 with incremental dosing), and the addition of epinephrine prolongs the duration of action while serving as a marker for inadvertent intravascular injection. Sodium bicarbonate alkalization increases the unionized fraction of lidocaine, accelerating onset. Epidural fentanyl improves block density and reduces the total local anesthetic dose required, thereby minimizing hemodynamic instability [13,14]. The incremental dosing strategy (5 mL aliquots) is essential: it allows titration, reduces the risk of catastrophic total spinal anesthesia from accidental subdural injection, and permits hemodynamic management between boluses.

Hemodynamic management in morbidly obese parturients requires particular attention. Aortocaval compression is exaggerated by excess abdominal adiposity, and the sympathectomy produced by a high epidural block can produce profound hypotension with uteroplacental insufficiency. In our patient, left uterine displacement was maintained throughout, and a phenylephrine infusion was initiated prophylactically given the anticipated sympatholysis. Phenylephrine is preferred over ephedrine in modern obstetric anesthesia practice as it maintains uterine blood flow more reliably and is associated with a higher umbilical cord arterial pH-consistent with our patient's cord gas result [16].

This case also emphasizes the importance of early aspiration prophylaxis in all parturients at risk of emergency cesarean delivery. While our patient received a full pharmacological prophylaxis protocol prior to anesthesia, the time-sensitive nature of emergency cesarean delivery may not always permit this luxury. The National Institute for Health and Care Excellence (NICE) guidelines and the American Society of Anesthesiologists (ASA) Obstetric Anesthesia Practice Guidelines both recommend antacid prophylaxis for parturients at risk, and our case reinforces the importance of administering these agents at the earliest opportunity-before detailed anesthetic planning has been completed-in any parturient presenting with a full stomach and a potential indication for operative delivery [16].

In reviewing the literature, few published case reports describe the deliberate use of a de novo epidural catheter as the sole primary anesthetic for cesarean section in the setting of failed spinal after full stomach aspiration risk in a morbidly obese parturient. This particular triple-risk convergence is unusual, and its management cannot be extrapolated directly from existing guidelines, which tend to address each risk factor in isolation. Our report contributes to the growing evidence that epidural anesthesia, when skillfully administered with appropriate pharmacology and monitoring, is a viable and safe primary anesthetic strategy for cesarean delivery in high-risk parturients for whom spinal anesthesia has failed and general anesthesia carries prohibitive risk.

Conclusion

This case demonstrates that de novo epidural anesthesia can function as a safe and effective primary anesthetic technique for emergency cesarean delivery in the morbidly obese parturient when spinal anesthesia fails and general anesthesia is contraindicated by coexisting airway risk and full-stomach aspiration risk. The decision-making process requires rapid, collaborative multidisciplinary assessment, explicit risk stratification, and a systematic approach that prioritizes regional over general anesthesia whenever feasible. Key elements for success include early aspiration prophylaxis, ultrasound-guided epidural placement, judicious pharmacological regimen with incremental dosing, proactive hemodynamic management, and high-dependency postoperative monitoring.

This report highlights the need for comprehensive pre-anesthetic assessment of obese parturients, including airway evaluation and gastric risk stratification, at the earliest point in their care-ideally at an antenatal anesthesia clinic visit. Preparedness for failed spinal anesthesia, with a clear escalation algorithm that includes epidural, CSE, and only then carefully managed general anesthesia, is essential in units caring for morbidly obese parturients. Further prospective studies

and case series are needed to define optimal protocols for this uniquely challenging patient population.

Patient consent and ethics

Written informed consent was obtained from the patient for the publication of this case report. Patient identifiers have been removed or modified to protect anonymity, in accordance with the Declaration of Helsinki and applicable institutional guidelines.

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