

Cesarean Section in Morbidly Obese Parturients: Practical Implications and Complications

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Abstract

The prevalence of obesity has reached pandemic proportions across nations. Morbid obesity has a dramatic impact on pregnancy outcome. Cesarean section in these women poses many surgical, anesthetic, and logistical challenges. In view of the increased risk of cesarean delivery in morbidly obese women, the practical implications and complications are reviewed in this article. A Medline search was conducted to review the recent relevant articles in english literature on cesarean section in morbidly obese women. The types of incisions and techniques used during cesarean delivery, intra-operative and postpartum complications, anesthetic and logistical issues, maternal morbidity and mortality were reviewed. Morbidly obese women with a body mass index (BMI >40 kg/m²) are at increased risk of pregnancy complications and a significantly increased rate of cesarean delivery. Low transverse skin incisions and transverse uterine incisions are definitely superior and must be the first option. Closure of the subcutaneous layer is recommended, but the placement of subcutaneous drains remains controversial. Thromboprophylaxis adjusted to body weight and prophylactic antibiotics help in reducing postpartum morbidity. Morbidly obese women are at increased risk of postpartum infectious morbidity. Weight reduction in the postpartum period and thereafter must be strongly encouraged for optimal future pregnancy outcomes and well-being.

Keywords: Anesthesia, Cesarean section, Morbid obesity, Postoperative complications, Postpartum morbidity, Pregnancy

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Introduction

The rapid upswing in obesity prevalence across nations, ages, and ethnic groups has reached alarming and pandemic proportions. The World Health Organization (WHO) reported in 2005 that 1.6 billion adults were overweight (BMI>25 kg/m²) and 400 million obese (BMI>30 kg/m²).^[1] The prevalence of morbid obesity (BMI>40 kg/m²) has increased by 50% between 2000 and 2005, with 8% of women in the reproductive age group being morbidly obese.^[1] The percentage of women with a body mass index (BMI) of 50 Kg/m² or more has increased five-fold in 20 years.^[2] Obesity is currently the most prevalent health threat the world over and its influence on general health is rapidly increasing.

Obesity has a dramatic impact on pregnancy outcome. Apart from an associated increased prevalence of diabetes and hypertension, obesity in pregnancy has been associated with poor perinatal and neonatal outcomes. Obese mothers have an increased risk of pregnancy complications such as anemia, hypertension, pre-eclampsia, preterm delivery, emergency cesarean section, and gestational diabetes.^[3] Weiss *et al.*,^[4] demonstrated that obesity significantly increases the rate of cesarean section and report a cesarean section rate of 20.7% in a normal weight control group as compared to 33.8% in obese women, and 47.4% in morbidly obese women (BMI>35kg/m²). There is little evidence in the literature about whether elective cesarean section or normal vaginal birth is the optimal mode of delivery in morbidly obese parturients. The rate of emergency cesarean in morbidly obese women is reported to vary from 42 to 50% compared to around 9% in the control group.^[5] It is well-documented that surgery in the morbidly obese patient poses many surgical, anesthetic, and logistical difficulties. Moreover patients with BMI>40 kg/m² have an increase in total operative time, and time from skin incision to delivery.^[6]

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Complications Related to Pregnancy

Obesity is considered a major and frequent risk factor for developing complications in pregnancy.^[3-10] The incidence of pulmonary embolism and primary postpartum hemorrhage is increased. Anesthesia-related complications are frequent. Neonatal consequences of obesity include an increased rate of congenital anomalies, still births, and macrosomia. Morbid obesity seriously impacts pregnancy and reported risks include an overall increase in cesarean delivery (OR 2.9), five-minute Apgar scores less than 7 (OR 3.0), birth weight more than 4,500 grams (OR. 8.1), and intrauterine growth restriction (OR 9.3).^[10] The relatively less frequent complications include shoulder dystocia and still birth.^[3] In view of the increased risk of cesarean delivery in morbidly obese patients, its practical implications and associated complications are reviewed in this article.

Practical implications related to cesarean section in a morbidly obese patient:

Positioning the patient

Standard practice is to position the operating table at a 10 to 15 degree left lateral tilt. In obese patients this is even more important for reducing maternal hypotension and its consequences. The operating table should be constructed to allow this position.^[8]

Abdominal incision

The abdominal incisions used for cesarean section are usually the focus of discussion and may include the vertical midline incision, Maryland incision, Cohen incision, and Pfannenstiel incision.^[8] Modern women tend to be more aware of their body image and the use of the Pfannenstiel incision or low transverse skin incision has become the norm.^[6-9] In morbidly obese patients, however, the use of such an incision in the moist region below the panniculus remains a debated issue.^[6,7] Some support the use of a Pfannenstiel incision in obese patients with a large panniculus,^[6,7] and contradict the classical teaching and concerns that a transverse abdominal incision made under the panniculus fold with a warm moist anaerobic environment would increase bacterial content, leading to proliferation of numerous microorganisms, producing a bacterial cesspool and promoting infection.^[11] Figure 1 shows a morbidly obese woman 6 weeks following cesarean delivery with the transverse skin incision under the panniculus. The Pfannenstiel incision, however, may pose significant difficulty in obtaining adequate exposure in the obese pregnant patient. Cephalad retraction of the panniculus in morbidly obese patients during cesarean section carries the risk of hypotension and fetal compromise, as well as respiratory difficulties, especially with a regional block, and hence, must be done with great care and



Figure 1: A morbidly obese woman 6 weeks following Cesarean delivery with the transverse skin incision under the panniculus

concern.^[12] The overhanging panniculus is dealt with by some obstetricians by using Montgomery straps applied to the upper abdomen, tied to the operative bed rail to retract the panniculus cephalad.^[7] Use of hooks to attach a chain to railings across the operating table and a large Doyen's retractor to contain the edge of the panniculus has been described as a simple, effective, and a more convenient alternative.^[12]

A vertical skin incision is an alternate approach for cesarean section in morbidly obese patients.^[6,7,13] However, vertical skin incisions compared with low transverse incisions are associated with an increase in postoperative pain, postoperative atelectasis, superficial wound, and fascial dehiscence.^[6,7] In addition when a vertical skin incision is made in a morbidly obese patient, the incision often overlies the uterine fundus potentially limiting the access to the lower uterine segment, which may then warrant a vertical uterine incision. The incidence of classical vertical uterine incision is reported to vary from 14 to 23%.^[6,7,14] A vertical uterine incision is associated with significant morbidity in subsequent pregnancies. The risk associated with the use of classical uterine incisions are well known in obstetrics and include four to nine times increased risk of uterine rupture compared to a low transverse uterine incision; notably in about a third, such a rupture occurs before labor, sometimes several weeks before term.^[6] In addition, classical uterine incisions are associated with significantly more postoperative morbidity, such as, increased postoperative pulmonary complications and intestinal obstruction.^[15,16] A vertical skin incision is also reported to be associated with a substantial increase in wound infection when compared with the low transverse incision (OR 12.4, 95% CI)^[13] and the incidence is reported to be 23% versus 6% in patients with Pfannenstiel incision. In one of the reports, the average additional cost of wound infection after discharge was found to be \$3382

compared to those without a wound complication.^[17] Moreover, patients experience increased pain, emotional stress, and decreased productivity following a vertical incision.^[17]

Subcutaneous tissue thickness was found to be the only factor that correlated with wound infection in one study.^[18] Suturing the subcutaneous fat layer is reported to reduce postoperative wound disruption when the fat layer is at least 2 cm deep, but wound infection has not been seen to reduce subcutaneous fat closure.^[19] The role of subcutaneous drains is controversial. There are some authors who believe that the use of subcutaneous drainage does significantly reduce wound infection in fat layers of more than 2 cm thickness.^[20] However, there are others who strongly discourage the use of subcutaneous drains to reduce infection after cesarean section.^[7,21,22] Their concern is that the correct placement of subcutaneous drains involves an additional incision in the abdominal wall, resulting in increased tissue damage. The drain tubing may provide a route by which bacteria may gain access to the subcutaneous space. Moreover, most cesarean deliveries are clean contaminated operations and this may result in the drain acting as a reservoir for bacteria. There are some surgeons, however, who recommend the use of closed suction drains to decrease the formation of loculated fluid in the deep subcutaneous space.^[23] Even as the role of subcutaneous drains is still not settled, one should be aware of the other potential predictors for cesarean wound complications, including Methicillin-resistant *Staphylococcus aureus* (MRSA) carrier status, the use of chlorhexidine preoperative skin cleaning, and glycemic control in diabetic patients.^[24-26] The preventive use of antibiotics has been reported to play a major role in reducing the post cesarean wound infection rate.^[6,7,27] However, questions related to optimal current prophylactic doses, the time of administration, and perhaps the need for a more prolonged use of antibiotics in morbidly obese parturients need to be addressed. Anesthesia-related complications Morbidly obese women undergoing scheduled cesarean delivery have greater overall anesthesia-related complications, more complicated placement of regional anesthesia, and more frequent requirement of general anesthesia, than women with lower weight.^[28-30] Women with pre-pregnancy BMI > 40 kg/m² and delivery BMI > 45 kg/m² are particularly at risk for complications of regional anesthesia. Morbidly obese women have a higher rate of failure of epidural anesthesia and are likely to have difficult intubation. Inability to identify landmarks, difficulty in placing the regional block, and erratic spread of the anesthetic solution contribute to the failure rate.^[28-30] The high initial failure rate necessitates early catheter placement and critical block assessment. Profound hypotension not related to blood loss has been reported in two to eight

percent of these patients following regional anesthesia. The profound hypotension in morbidly obese patients may be refractory to measures like intravenous pressors and intravenous fluids and may require intensive care admission, resuscitation, and monitoring. For optimal care antepartum screening, and evaluation by anesthesiologists is warranted.^[28-30] Local anesthetic techniques may be difficult and time consuming in obese women. All these factors should be considered when the decision for an emergency cesarean section is made.^[29] Most of the anesthesia-related morbidity and mortality encountered during cesarean delivery is due to complications of general anesthesia, especially as a consequence of failed intubation and aspiration. These are taken into account when a decision is made for cesarean section and the patient must be adequately counseled.

A combined spinal epidural technique (CSE) may represent the ideal anesthetic for cesarean delivery of morbidly obese women because, if successfully placed, it provides a dense surgical blockade (spinal portion) with potential prolongation of anesthesia (epidural portion) as is often required for extended operative times in these women.^[30]

Maternal mortality

Obesity in general is considered a major risk factor for chronic disease including diabetes and hypertension, all of which could by itself contribute to mortality. In a report of British Confidential Enquiry into Maternal Deaths of 391 cases, assessed for a period of three years, from 2000 to 2002, the observations made were that depression and obesity were the major causes of maternal deaths in UK.^[31] About 35% of the deceased women were obese, which was 50% more than in the general population. Obesity in general is considered a major risk factor for health problems and is causally related to chronic diseases, which all contribute to the mortality.^[7,32]

Postpartum complications

In morbidly obese patients the incidence of endometritis is almost three times higher than in non-obese patients and amounts to nearly 10%, the OR being 1.5 (95% CI 1.1 to 2.1).^[32,33] In massively obese patients weighing more than 136 kgs the incidence of postoperative endometritis is even higher at 32.6% versus 4.9% in normal-weight women.^[33] The incidence of wound infection is more than double in obese patients.^[27,33] Post cesarean wound infection was found to double with every five-unit increment of BMI.^[33] The risk of postoperative infection can be reduced by prophylactic antibiotics.^[6,27,33] It is still questionable whether changes in current dosage, timing, and duration of antibiotics in obese patients can lead to a further reduction in infectious morbidity.

Simple measures like reducing the number of vaginal examinations and early intervention with oxytocin, to avoid prolonged labor, have also been shown to reduce infection rates.^[34]

The incidence of postpartum hemorrhage varies from no increase to a 70% increase in morbidly obese women.^[35,36] Blood loss is always difficult to quantify and a more useful outcome could be the number of packed red cell transfusions given.^[8] Higher BMI is nevertheless strongly correlated with postpartum anemia, the risk being 2.8 times higher (95% CI 1.7–4.7).^[37] In morbidly obese women, blood loss during cesarean section is expectedly greater than in normal-weight women. In this group of women, blood loss more than 1000 ml was 34.9% versus 9.3% in non-obese women.^[33] Obese women have an increased risk of adverse neonatal outcomes.^[36,38] Thromboembolic disease is also more frequent in obese women.^[33,39] However, pulmonary embolism has not been seen to be increased in obese women, as no study has shown a large enough sample, leading to inadequate statistical power, for reliably detecting differences in the rate of this complication.^[36] When prophylactic anticoagulants are given, the dose must be related to the woman's body weight.^[8] This can be achieved by giving low molecular weight heparin once a day. The initial administration is most effective when given <2 hours before the surgery and six to eight hours following the operation.^[40,41] The duration of prophylactic anticoagulant therapy after surgery is still under debate. In acutely ill patients, the venous thromboembolism risk is similar to that in surgical patients.^[40,41] In these patients, at least two weeks of prophylactic anticoagulant therapy is generally recommended.^[41]

Postpartum urinary complaints such as stress incontinence are more frequent among obese women, but they are also related to parity and mode of delivery.^[42] Postoperative urinary tract infection is also more frequent in obese women.^[36] Consequently the hospital stay of obese women is longer than normal weight women after both vaginal and cesarean delivery.^[8,33]

Weight retention post partum

With an average amount of weight gain during pregnancy, the weight retention following delivery will be 1 kg. This amount is above the normal weight gain of 0.45 kg/year with age.^[8,43] Excessive weight gain during pregnancy is assumed to be associated with the development of obesity in the postpartum period.^[43] Postpartum weight loss, is therefore, essential for preventing permanently increased weight.^[44] Lactation is considered to promote weight loss, but the weight loss is highly variable among lactating women.^[45] The observation that breast feeding fails more often in obese women can be substantiated by the decreased prolactin

response to suckling in the first week post partum.^[45] Losing weight during breast feeding is safe and does not interfere with neonatal weight gain.^[46]

Special considerations

Most of the hospital furniture is not geared for dealing with morbidly obese patients, and hence, requires adaptation for managing such patients. Standard hospital beds, wheelchairs, operating tables, imaging equipment, and even scales are not designed to accommodate the growing number of obese patients. For morbidly obese patients, two standard 50-cm-width operating tables secured together may be necessary.^[8] Specially constructed wider operating tables would be ideal. Weighing scales suited for obese patients are necessary not only to measure weight and evaluate weight gain during pregnancy, but also for calculating medication dosages.^[8] A wider delivery bed that is easy to move around and that may be used at all stages of delivery, including cesarean section, without the need to move the patient into another bed is most useful. Difficulties are also encountered if the patient has to undergo computed tomography or MRI scanning, as these equipments have weight limits.^[8] Nursing care of obese patients requires ergonomic adaptation and knowledge about the special risks involved in caring for these patients. More trained nurses are necessary to care for morbidly obese patients.^[8]

Prevention

Due to the overall morbidity associated with obesity, including that during pregnancy and parturition, the ultimate goal of prevention is for individuals not to develop an obesity problem at all. Once obesity is present, reducing the weight is difficult and disappointing. Obese women should preferably reduce weight before conceiving. In women who have lost more than 4.5 kgs between two pregnancies, the risk of developing gestational diabetes decreases by nearly 40%.^[8,47] The ideal amount of weight loss in six months is 10% of the total body weight.^[48] This not only keeps weight loss within safe limits, but also guarantees a longer lasting effect. Weight reduction can be achieved by dietary measures, physical activity, medication, and if these measures fail, surgical procedures like gastric banding or bypass may be required.^[49]

Conclusion

Morbidly obese pregnant women with a BMI >40 kg/m² are at an increased risk of pregnancy complications and a significantly increased rate of cesarean delivery. Pre-anesthetic evaluation and a scheduled cesarean is optimal, but not always possible. Low transverse skin incisions are feasible and preferred to vertical skin incisions in these women. The role of subcutaneous drains still

remains controversial, but closure of the subcutaneous layer is generally recommended. Transverse uterine incisions are definitely superior, impact future pregnancy outcomes, and must be the first choice. The dose of thromboprophylaxis needs to be higher and adjusted according to bodyweight. Prophylactic antibiotics reduce postoperative infections in obese women and are highly recommended. The key issue, however, remains centered around weight reduction postpartum, with a permanent change in diet and lifestyle. Breast feeding, which may promote further weight reduction, must be encouraged.

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