CASE REPORT

Super-obese pregnancy - understanding the difference from a normal pregnancy and using early multidisciplinary intervention can lead to good outcomes: a case report

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Super-obesity (defined as a body mass index > 50 kg/m²) is quite rare in Japan, and associated with various perinatal complications. Here we report a case of a 30-year-old nulliparous woman with a body mass index of 55.2. Obstetricians, anesthesiologists, physicians, and dietitians provided information and counseling from the early stage of pregnancy, given the potential difficulties during pregnancy and labor. She gained only 2 kg during the pregnancy, and the pregnancy course was uneventful except for the emergence of gestational diabetes and initiation of insulin therapy. To address the difficulties associated with super-obesity, three fetal anatomical scans were performed, a bariatric ward bed and operating table were prepared, and an epidural catheter was inserted early in labor. At 40 weeks of gestation, a baby was delivered vaginally after spontaneous labor onset. Although uterine contractions were difficult to detect, the measures taken made it possible to manage labor without any notable complications.

Introduction

Obesity (body mass index (BMI) > 30 kg/m²) is not only associated with various maternal complications, such as gestational diabetes mellitus (GDM), pregnancy-related hypertensive disorders, elevated cesarean section (CS) rate, and intensive care unit admission, but also contributes to neonatal complications, such as macrosomia, shoulder dystocia, neonatal hypoglycemia, and various conditions requiring intensive care.1-3 While the prevalence of obesity in the United States (US) (one in three people) and the United Kingdom and Canada (one in four people) is high, the prevalence in Japan is low (3.7%).4 Super-obesity, defined as a BMI > 50 kg/m², is exceptionally challenging to manage medically. The prevalence of super-obesity is reportedly 1.7% among non-diabetic patients in the US.2 The prevalence of women with super-obesity varies by ethnicity; individuals of African and European ancestry have a higher prevalence than those of Asian descent.2,5 Perinatal care for these patients requires meticulous attention. The present report describes a pregnant Japanese woman with super-obesity and the difficulties encountered during her medical care.

Case presentation

A 30-year-old female, gravida 2, para 0, elected to receive an induced abortion six years ago for her obesity (170 kg). Thereafter, she lost 15 kg and became pregnant again spontaneously. She was referred to our hospital at eight weeks of gestation for her obesity. At the initial visit, height was 167 cm, weight was 154 kg, and BMI was 55.2. She was unable to sit on the examining chair, which had a weight capacity of 130 kg. An examination bed with a higher weight capacity was therefore used instead. Results of initial laboratory tests were unremarkable except for postprandial blood glucose (BG).
100 mg/dl. Hemoglobin A1c (National Glycohemoglobin Standardization Program) was 5.3. She was asked to measure blood pressure and body weight (BW) at home daily. Given the high postprandial BG level, a 75 g oral glucose tolerance test was performed, based on which GDM was diagnosed (94/135/107 mg/dl for fasting BG and postprandial 1 h and 2 h BG, respectively). She was referred to an endocrinologist and was admitted for insulin therapy. Eventually, BG level stabilized with insulin 26 U/day (0.17 U/kg/day). After discharge, she received several nutrition counseling sessions. The same dose of insulin was continued to maintain an optimal BG level until delivery. A mid-trimester, fetal ultrasound was performed three times between 16 and 24 weeks of gestation and showed normal findings. At 26 weeks of gestation, discussions were held with an anesthesiologist to determine whether: 1) indications for CS should be based solely on obstetric findings rather than super-obesity; 2) a bariatric ward bed (Eleganza3 by LINET) should be used throughout labor, delivery, recovery, and the postpartum period; 3) the bariatric operation table (ALPHACLASSIC-PRO1118 by MAQUET) in the operating room (OR) should be used in case of emergency CS; and 4) an epidural catheter should be placed early and its efficacy confirmed in preparation for conversion to surgical anesthesia. The patient lost 3 kg of BW in the first trimester (154 kg to 151 kg), maintained the same weight in the second trimester, and gained 5 kg (151 kg to 156 kg) in the third trimester.

At 40 weeks and 2 days of gestation, she was admitted to our hospital due to labor onset in the morning (reference point). An epidural catheter was placed (+1 h) in the OR using the bariatric table to maintain the patient’s position for safe and sterile catheter placement. In the sitting position (Figure 1), the patient’s L2-3 and L3-4 intervertebral spaces were located by ultrasonography using a curvilinear 4.5 MHz ultrasound transducer. The L2-3 intervertebral space was chosen for catheter placement because the distance from the skin to the ligament flavum was 70.7 mm, which was less than at L3-4. Figure 2 shows the parasagittal oblique interlaminar view on ultrasonography. The epidural space was accessed at a depth of 8 cm on the second attempt using an 8 cm 17-G Tuohy needle with loss of resistance to saline. The catheter was threaded 5 cm into the epidural space and secured at a length of 13 cm to the skin, and 3 ml of 1% mepivacaine was administered as a test dose after negative aspiration. Fifteen minutes later, catheter efficacy was confirmed by testing for loss of cold sensation in the lower extremities using an ice pack, which indicated that the local anesthetic had not migrated into the subarachnoid space or vessels. Sweat and excess skin made affixing the epidural catheter to the skin difficult. Eventually, the catheter was fixed using Tegaderm.

Figure 1. Sitting position during epidural anesthesia placement.

Initial cervical findings on admission were 4 cm dilation, 50% effacement, and −3 cm station. Because these findings did not change much with time (+5 h) and a prolonged labor was expected, intravenous oxytocin was administered. She complained of severe labor pains and requested labor analgesia (+8 h). A solution consisting of 0.2% ropivacaine and fentanyl 5 micrograms/ml was administered twice via an 8 ml manual bolus and achieved satisfactory analgesia. Cervical findings remained unchanged, and nighttime induction was suspended. As the contractions subsided, no additional epidural analgesia was administered. Spontaneous uterine contractions later recurred (+18 h). Given the risk of an emergency CS, the patient’s information was shared with the OR staff, and she was placed under double-setup conditions. The patient requested labor analgesia again, and the same amount of epidural bolus was administered. Subsequently, programmed intermittent epidural boluses with patient-controlled epidural analgesia were initiated with 0.1% ropivacaine and fentanyl 2 micrograms/ml (1 h programmed bolus: 10 ml, demand dose: 4 ml, lockout interval: 20 min, 1-h limit: 20 ml) (+24 h). The anesthesiologist confirmed the sensory blockade level and absence of motor paralysis every hour throughout...
the delivery. Oxytocin infusion was resumed (+25 h) to augment the labor with 7 cm dilation, 80% effacement, and −2 cm station. The remainder of the delivery was uneventful, and a dense T9 epidural level and stable hemodynamics were maintained. The cervix was fully dilated (+50 h), and the patient delivered a 3,935-g female infant with Apgar scores of 8 and 9 at 1 and 5 min, respectively (+53 h). The placenta was spontaneously expelled, and total blood loss was 97 g. In summary, the first, second, and third stages of labor lasted 12 h, 2 h 43 min, and 6 min, respectively. The patient was ambulatory two hours after delivery and was discharged with her infant on postpartum day 5.

Discussion

The present case demonstrated that maternal super-obesity can result in various complications during the perinatal period. These are discussed below together with a review of previous reports.

1. Diabetes and hypertensive disorders in pregnancy

Our patient was diagnosed with GDM and required insulin therapy throughout pregnancy. Generally, pregnant women are physiologically insulin-resistant, and obesity can compound the risk of insulin resistance.

A recent report showed a higher prevalence of GDM in overweight, especially super-obese, women. Various reports have also demonstrated a strong relationship between super-obesity and gestational hypertension (GH) and pre-eclampsia (PE). Based on epidemiological data, endocrinological therapy should be started from conception in obese pregnancies. Promptly initiating regular blood pressure monitoring at home and starting GDM intervention earlier may contribute to a favorable outcome. In the present case, the patient’s BG level remained within an acceptable range, and the infant did not experience any hypoglycemic episodes. Moreover, the patient did not experience GH or PE.

An observational study reported that weight loss in obese women reduces the rate of certain obstetrical complications, such as GH and light-for-gestational age. However, the present study and others found that weight loss reduces birth weight and increases the incidence of preterm birth, even in obese women. Therefore, there is no clear consensus regarding the effects of weight loss in obese pregnancies.

2. Fetal macrosomia and difficulty of antenatal detection of congenital anomalies

An abnormally high maternal BMI is associated with fetal macrosomia, TTN, and delivery complications, such as shoulder dystocia and brachial plexus injury.
A high maternal BMI also limits ultrasonographic visualization of the fetal anatomy. In the present case, a fetal anatomical scan was performed three times by two physicians between 16 and 24 weeks of gestation due to poor visualization. It is important for multiple individuals to perform scanning multiple times to obtain a satisfactory image. Although the estimated fetal body weight (EFBW) was normal in the present case, the infant’s birth weight was 3,935 g, which closely approached macrosomia (birth weight > 4,000 g). Preparing for potential macrosomia and consequent shoulder dystocia when the mother is super-obese may be desirable even if the EFBW is within the normal range.

3. Inpatient equipment and transportation
Obese patients require special equipment in the hospital and OR. Most Japanese hospitals are not accustomed to caring for obese patients. Hence, the lack of adequate equipment for inpatient care and patient transportation may become a serious issue. The BW of our patient exceeded the capacity of the examination bed (130 kg) and delivery bed (135 kg). We decided to use a bariatric ward bed (Eleganza3 by LINET), which has a 250 kg weight limit, at each stage of care, including labor, delivery, recovery, and the postpartum stage. Given a spontaneous, uncomplicated delivery, only the ward bed was necessary for delivery. However, had the patient required an operative delivery, vacuum-assisted delivery with downward traction would have been difficult due to the configuration of the flatbed.

4. Typical course of delivery and ideal labor monitoring
Maternal obesity is associated with abnormal labor in the active phase, specifically, the arrest of dilation, but the duration of the second stage of labor is similar to that of women with normal BMI. Although obesity does not normally increase the incidence of perineal lacerations or the frequency of operative deliveries, a previous study reported a significant association between obesity and CS. In line with epidemiological findings, the first stage of labor was longer in the present patient compared to normal pregnancies. Oxytocin augmentation was initiated, but adequate information on the objective strength of the labor, for which tocodynamometry alone is used at our hospital, was difficult to obtain. Past reports have shown that tocodynamometry correlates poorly with intrauterine pressure catheter (IUPC) readings and often fails in obese patients. Although the IUPC is not routinely used for monitoring, it can help improve patient management.

5. Epidural analgesia during vaginal delivery
Because the risk of CS in women with super-obesity is reportedly as high as 50%, early epidural catheter placement is recommended. It was previously assumed that super-obese parturients were prone to weak labor and required a longer delivery time. Therefore, the prolongation of the second stage of labor due to epidural analgesia was a matter of concern. However, by using a low concentration of a local anesthetic with a small amount of opioid, motor paralysis was minimized and appropriate analgesia was achievable without affecting the ability to push. Moreover, spontaneous labor occurred, and the delivery progressed smoothly with moderate oxytocin augmentation. Nonetheless, high-dose oxytocin may be necessary in some cases.

Ultrasoundography prior to epidural catheter placement in super-obese pregnant women is helpful for identifying the intervertebral space and depth estimation. In the present case, fixing the catheter was challenging, and applying a 2-ethyl cyanoacrylate adhesive at the insertion site was useful for preventing its accidental removal. In addition to epidural catheter placement, delivery was monitored under double-setup conditions to prepare for a possible emergency CS. Anesthesiologists prepared OR equipment, such as a video laryngoscope and ramp positioner, for a potential difficult airway in the event general anesthesia was used.

In conclusion, super-obese pregnancies are still rare in Japan despite the increasing obesity rate. The present case provided several useful insight into safe management of this challenging population, including immediate assistance by endocrinologists; frequent anatomical ultrasonography to compensate for poor visualization; the possibility of using the same bariatric ward bed at each phase of delivery; the potential for early epidural catheter placement to reduce the need for general anesthesia in case of an emergency CS; the utility of ultrasound guidance for epidural catheter placement; and the superiority of the IUPC to tocodynamometry for detecting objective uterine contractions. Lastly, a multidisciplinary team approach and close communication were found to be highly effective countermeasures against possible difficulties.

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Conflicts of interest

There are no conflicts of interest associated with this study.
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