Anaesthetic management of a complex morbidly obese parturient

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A case is presented of a morbidly obese parturient who had multiple medical problems. She had angina and was receiving nitrate therapy, had insulin-dependent diabetes mellitus, hypertension, asthma and benign intracranial hypertension (pseudotumour cerebri). Lumbar epidural analgesia was chosen for labour and delivery and resulted in an uneventful outcome.

Une parturiente souffrant d'obésité morbide est récemment venue accoucher dans notre institution. Elle prenait des nitrates pour son angine et de l'insuline pour son diabète. Elle faisait aussi de l'hypertension artérielle, de l'asthme et de l'hypertension intracrânienne bénigne (pseudotumeur cérébri). On utilisait sans problème un cathéter épidural afin d'assurer une analgésie adéquate pendant le travail et l'accouchement.

Various definitions of morbid obesity exist. Body Mass Index (BMI, weight in kg divided by the height in meters squared), defines obesity as a BMI greater than 30 and morbid obesity as a BMI greater than 40.¹ Garbaciak *et al.*² used a definition of greater than 150% of ideal body weight in a study examining maternal weight and pregnancy complications. They found that in obese women with antenatal complications (gestational diabetes, hypertension, preeclampsia) there was an increase in perinatal mortality, primary Caesarean delivery and mean infant

birth weight. Others have confirmed the risk associated with obesity and pregnancy.^{3,4}

A case of the successful management of a morbidly obese parturient with ischaemic heart disease and benign intracranial hypertension is presented. Other medical problems added to the challenge of management.

Case report

The parturient was a 42-yr-old G3, A1, P1 whose single previous term pregnancy ended in a vaginal birth 23 yr previously. The current pregnancy was unplanned and the expected date of confinement was confirmed by ultrasound.

In view of the multiple medical problems an anaesthesia consultation was requested at 35 wk gestation. At this stage, her weight was 168 kg and her height was 158 cm. Her abdominal panniculus extended to her knees and she had a further fat pad beneath this. Several fat pads extended over her back and depending on her posture, the lowest covered her lumbar spinal region (Figure 1). Her neck was short but there was a full range of movement of both the neck and the temporomandibular joints with no limitation of mouth opening. Her breasts were large (Figure 2).

She gave a history of angina on exertion and palpitations. Hypertension had been diagnosed six years previously. The ECG showed unifocal ventricular premature depolarizations which coincided with her palpitations. Twenty-four hour Holter monitoring demonstrated non-specific ST-T wave changes, compatible with reversible myocardial ischaemia. Nitrate therapy had been established (Nitrong® SR 2.6 mg bid) and this controlled the angina, with improvement in the hypertension. No other therapy was required for this problem.

In addition, she had asthma, controlled with the use of a salbutamol inhaler, and insulin-dependent diabetes. Approximately six weeks before delivery, her insulin requirements had increased to 242 units daily, in divided doses.

At about 34 wk gestation, benign intracranial hypertension (pseudotumour cerebri) developed. This was diagnosed when she developed headache and a progressive

Key words

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FIGURE 1 View of the patient from the back.

loss of visual acuity in the right eye, primarily central vision loss. She had a normal computerized tomography (CT) scan but increased intracranial pressure (ICP) on lumbar puncture. This was treated initially with prednisone and diamox® but as there was progressive loss of vision, surgical decompression of the optic nerve was performed under local anaesthesia. This resulted in gradual visual improvement.

The patient was admitted to hospital at 36 wk gestation to optimize her condition. An ultrasound examination demonstrated moderate fetal hydrocephalus and a normal upper spine but the lower spine was not visualized. The plan was for a spontaneous labour and vaginal delivery. Caesarean section would only be done to reduce maternal risk.

Obstetric, anaesthesia and nursing staff met before the expected date of delivery to discuss plans for her management. Early epidural analgesia was proposed, to decrease the stress of labour. This could be extended, if required, for Caesarean section, thus avoiding general anaesthesia. The patient's width was measured and plans were made to increase the size of the operating room

FIGURE 2 Head and neck view of the patient.

table. Arm boards, positioned longitudinally on the OR table, provided sufficient additional width. Extra long instruments and retractors were obtained.

At 41 wk by dates (39 wk by ultrasound) her daily insulin requirement decreased suddenly to 166 units, indicating fetal compromise. Technical difficulties, due to the size of her thighs, did not allow cervical assessment so it was decided to proceed with a slow oxytocin induction of labour. At this time, her haemoglobin concentration was $121 \text{ g} \cdot \text{dl}^{-1}$, platelet count $300 \times 10^9 \cdot \text{L}^{-1}$, PT, INR, APTT and renal function were normal.

Induction of labour with oxytocin was achieved over two days. Using an external fetal heart rate monitor, the fetal heart could only be detected intermittently, due to the size of the maternal panniculus. As the cervix could not be reached digitally, internal fetal monitoring was also impossible. Blood sugar was monitored hourly and subcutaneous insulin administered to maintain glucose homeostasis. Nitropaste was applied prophylactically to control angina.

Once labour was established with regular contractions,

an arterial line was inserted for blood pressure monitoring and continuous ECG monitoring was instituted. The patient was then seated on a small stool with her knees apart, so that the abdominal panniculus could hang freely, for epidural catheter insertion. The epidural space was identified on the first attempt, using loss of resistance to saline. The patient was returned to the labour bed and 8 ml bupivacaine 0.25% was injected in divided doses through the catheter over five minutes. The blood pressure remained in the range of 165/80 to 194/78 mmHg. The patient was nursed in a head-up position (45°) to decrease pressure on the optic nerve and to improve ventilation, and left lateral uterine displacement was achieved with a wedge. Once the patient was comfortable, a continuous infusion of 0.125% bupivacaine, with $2 \mu\text{g} \cdot \text{ml}^{-1}$ fentanyl was begun through the epidural catheter at a rate of $8 \text{ ml} \cdot \text{hr}^{-1}$. Nine hours later, she required an additional 5 ml 0.25% bupivacaine and the rate of the infusion was increased to $10 \text{ ml} \cdot \text{hr}^{-1}$. Three ml of 0.25% bupivacaine and $75 \mu\text{g}$ of fentanyl were given two hours later when the cervix was fully dilated. She delivered spontaneously a stillborn female with multiple abnormalities $2\frac{1}{2}$ hr later. Autopsy of the infant revealed an Arnold-Chiari malformation with meningocele, coarctation of the aorta, growth retardation, acute fetal asphyxia and evidence of placental abruption.

The peripartum period was marked by stability of maternal blood pressure and ECG, with no evidence of angina. She had an uneventful postpartum course and was discharged five days after birth taking 26 units of insulin, in divided doses, and with markedly improved vision.

Discussion

This parturient had multiple medical problems. Those considered most important were her morbid obesity and coronary artery disease.

Obesity complicated the obstetric and anaesthetic management. Continuous electronic fetal monitoring and ultrasound examination of the fetus were technically difficult, because of the large panniculus, while assessment of cervical effacement and dilatation was impossible until the beginning of the second stage of labour. Blood pressure monitoring, even using the large cuff, was technically difficult and, therefore, invasive monitoring was instituted.

Epidural analgesia was chosen for labour as it was considered to provide the most effective analgesia without compromising the patient's medical condition. Narcotics, while effective analgesics, have the potential to cause respiratory depression. This problem is compounded in the obese parturient due to reduced respiratory compliance and functional residual capacity.¹ Epidural analgesia decreases the work of labour and decreases oxygen

consumption.⁵ In addition, if Caesarean section had been required for maternal reasons the block could have been extended.

The possible problems associated with epidural analgesia (hypotension, rebound tachycardia and high block) were circumvented by the slow, incremental administration of bupivacaine, followed by a continuous infusion of bupivacaine and fentanyl. This allowed control of the level of the block and possibly a lower total dose of bupivacaine. This technique did not interfere with motor power as the patient was able to move about the bed and to push during the second stage. Retention of motor power may decrease the risk of deep venous thrombosis.

Possible anaesthetic problems in the obese parturient include technical difficulty in (1) monitoring the mother and fetus, (2) tracheal intubation, and (3) establishing regional blockade. During Caesarean section cardiovascular changes can occur with cephalad retraction of the abdominal fat pad, particularly with relaxation of the abdominal wall and/or cephalad retraction.⁶ The obese parturient also is at increased risk from postoperative complications such as deep venous thrombosis, pulmonary atelectasis and wound infection.

A review of the anaesthetic outcome in morbidly obese parturients by Hood *et al.*⁷ confirmed these risks. Retrospectively, they examined the charts of all patients ($n = 117$) whose weight exceeded 300 pounds at the time of delivery. Antenatal medical disease complicated 47% of these pregnancies and obesity increased the chance of Caesarean section (72 required emergency Caesarean section). Successful epidural anaesthesia was obtained in 94% of all patients but several required catheter replacement and some required three or more epidurals. Seventeen patients (24%) had general anaesthesia for Caesarean section, one-third of which was characterized by difficult intubation. Thirty-five percent of the Caesarean section patients had some postoperative morbidity. There were no maternal or immediate neonatal deaths.

The principles of management of myocardial infarction and of myocardial ischaemia during pregnancy have been described.⁸⁻¹⁰ The increasing cardiovascular stress associated with late pregnancy and delivery pose a serious risk to women with ischaemic heart disease and limitation of myocardial oxygen demand and consumption is important. Labour increases cardiac output and heart rate, both of which increase the oxygen demand by the heart. Provision of adequate analgesia allows normalization of cardiac output and heart rate.⁵ Difficult intubation, rebound hypertension following tracheal intubation and ventilation/perfusion inequalities during general anaesthesia may prove hazardous to the parturient with myocardial ischaemia.

Benign increased intracranial hypertension (pseudo-

tumour cerebri) is a rare syndrome characterized by increased intracranial pressure without localizing signs.¹¹ It is more prevalent in women of childbearing age, particularly in those who are obese. Headache and visual disturbances are common and are associated with papilloedema. Diagnosis is by exclusion after laboratory and neurological examination. Treatment includes weight reduction, diuretics, steroids, CSF drainage and orbital decompression. In the parturient, control of CSF pressure during labour is important. Epidural analgesia prevents the wide swings in cardiac output, blood pressure and CSF pressure that occur with contractions and provides optimal conditions for labour and delivery.

Any pregnant patient has the potential of becoming a surgical patient. Fetal distress may necessitate immediate operative delivery which, in a patient such as this, poses many problems. Early consultation allows an opportunity to assess the risks and benefits of different management plans.

In summary, a case report is presented of a morbidly obese parturient of advanced maternal age, who also suffered from coronary artery disease, hypertension, asthma, insulin-dependent diabetes mellitus, and benign increased intracranial pressure. Early provision of epidural analgesia allowed this lady to labour in comfort and to delivery uneventfully.

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