Obesity in pregnancy

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Abstract

The prevalence of obesity has reached alarming proportions globally, and continues to rise in both developed and developing countries. Maternal obesity has become one of the most commonly occurring risk factors in obstetric practice. For the mother, obesity increases the risk of obstetric complications during the antenatal, intrapartum and postnatal period, as well as contributing to technical difficulties with fetal assessment. The offspring of obese mothers also have a higher rate of perinatal morbidity and an increased risk of long-term health problems.

Keywords gestational diabetes; macrosomia and postpartum haemorrhage; obesity; pre-eclampsia; recurrent miscarriage; thromboembolism

Introduction

Global obesity has doubled in the period between 1980 and 2010. Obesity is not only confined to well resourced developed countries but is also seen in the lesser resourced countries as well. It has been reported that, for every increase in Body Mass Index (BMI) of 5 kg/m^2, there was a 30% overall higher mortality with a 40% increase in vascular mortality, a >50% increase in diabetic, renal and hepatic mortality, a 10% in neoplastic mortality and 20% increase in respiratory and other mortalities. Obesity in pregnancy is one of the commonest risk factors that affect both the mother and the baby, identified in clinical practice today. Obesity in pregnancy is defined as a BMI of 30 kg/m^2 or more at the first antenatal visit. There are three classes of obesity which recognise the relationship between BMI, morbidity and mortality. They include BMI 30.0–34.9 (Class 1), BMI 35.0–39.9 (Class 2) and BMI 40 and over (Class 3 or morbid obesity).

Women with a BMI $\geq$ 30 and their babies are at risk of the following complications when compared to women with have a healthy pre-pregnancy weight (Table 1).

Complications of obesity in pregnancy

Maternal	Fetal/Neonatal
Miscarriage	Stillbirth
Gestational diabetes	Congenital anomalies
Pre-eclampsia, gestational hypertension	Macrosomia
Venous thromboembolism	Prematurity
Induction of labour	Neonatal death
Caesarean section, operative vaginal delivery	Birth injuries including shoulder dystocia
Anaesthetic complications	
Wound infection, endometritis	Obesity and metabolic disorders in childhood
Breastfeeding issues	

Table 1

Case 1

Gemma is a 32-year-old para 0+2, with a booking BMI of 39 kg/m^2. This is her first ongoing pregnancy and she has had two spontaneous miscarriages in the past around 7–9 weeks of gestation. She was diagnosed with gestational diabetes mellitus (GDM) at 28 weeks of gestation. She had been managed with dietary control and oral metformin 500 mg three times a day. This regimen normalized the blood sugar levels. An USS at 34 weeks revealed that the abdominal circumference of her baby was well above the 95th centile. However at 38 weeks of gestation, there was evidence of high fasting blood glucose and reduced fetal movements. Induction of labour was carried out at 39 weeks with vaginal prostaglandins but it was unsuccessful. She underwent emergency caesarean section. She had a postpartum haemorrhage requiring blood transfusion, due to a combination of uterine atony and trauma. The newborn weighed 4.55 kg requiring neonatal intensive care due to hypoglycaemia.

Case discussion

Miscarriage

The effect of BMI on the risk of miscarriage is unclear. Some studies suggest an incremental dose effect (risk of miscarriage increases with increasing BMI) while others do not.

Vitamin D prophylaxis

Women with a BMI $\geq$ 30 are also at an increased risk of vitamin D deficiency during pregnancy and breastfeeding which can impact upon both mother and baby. This is compounded by limited sunlight exposure in the UK. Women should be offered 10 μg of vitamin D throughout their pregnancy and breastfeeding.

Gestational diabetes

Women with obesity in pregnancy are prone to developing GDM. The absolute risk for GDM was 0.9% for normal weight women, 3.1% for overweight women, 6.7% for obeses women and 9.3% for severely obese women. In general, obese women have decreased insulin sensitivity before and during pregnancy compared with normal weight women. Hyperglycaemia in women with gestational diabetes is a result of an inadequate

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insulin response relative to decreased insulin sensitivity. Both obesity and gestational diabetes are associated with insulin resistance, however each condition has an additive and independent effect on maternal and neonatal outcomes.

Large for dates

High birth weight is common in infants born to obese women. Infants of obese mothers tend to be anthropometrically different specifically with regards to increased body fat distribution as compared to mothers with normal weight. American College of Obstetricians and Gynaecologists (ACOG) suggests considering an elective caesarean delivery for all women who babies weigh more 5 kg without diabetes in pregnancy and more than 4.5 kg if they have diabetes when assessed as LFD using ultrasound scanning despite its limitations. This is thought to reduce the risk of obstructed labour. Assessment of babies being LFD is difficult clinically and by ultrasonography due to technical difficulty. The accuracy of ultrasound for fetal biometry is within ±10%, but in obese mothers this performance tends to be poor with higher BMIs and at the extremes of fetal weight. Accuracy range for determining fetal macrosomia may vary between 47 and 64%.

A large population survey of 142.404 deliveries showed a significant increased risk of shoulder dystocia (AOP 1.61; 95% CI 1.04−2.51) in women weighing 120 kg or more.

Induction of labour

The Royal College of Obstetricians & Gynaecologists (RCOG) recommends that induction of labour (IOL) should be reserved for specific obstetric and medical indications only. Often inductions are necessary for medical reasons such as diabetes or hypertension. In women with LFD babies (independent of GDM) evidence suggests that IOL is beneficial over expectant management in terms of outcomes such as shoulder dystocia, birth fractures and birth weights without altering the risk of caesarean delivery and instrumental birth. This is however, always going to be a contentious issue as more evidence becomes available.

Maternal obesity is associated with dysfunctional labour including poor progress and the overall length of labour. Most evidence suggests a prolonged first stage of labour although the cause remains unknown. More recent evidence from a randomised control trial suggests no correlation between the length of labour and BMI.

Caesarean section

The risk of caesarean section is increased in women who are obese and these caesarean sections tend to be technically difficult as compared to normal weight women. The unadjusted odds ratios (OR) of caesarean delivery are 1.46 (1.34−1.60) and 2.05 (1.86−2.27) in overweight and obese women. Antibiotic prophylaxis is important as with all caesarean deliveries however there is no consensus on the BMI specific dosing. Clinical practice guidelines from Canada, for example, recommend that clinicians consider doubling the antibiotic dose in the setting of a maternal BMI more than 35 kg/m^2. The risk of wound infection in these women is OR 1.6 (1.2−2.2) for overweight women, OR 2.4 (1.7−3.4) for class I obesity and OR 3.7 (2.6−5.2) for class II and class III obesity. Women with a BMI of 45 kg/m^2 or more have a two to four times increased risk of postoperative wound infection. A reduction in wound disruption rates was noted when subcutaneous tissue with a depth of more than 2 cm was closed and this practice of surgical wound closure has been endorsed by the RCOG.

Postpartum haemorrhage

Obese women are prone to primary postpartum haemorrhage and some authors suggest that there is a persistent attributable risk to obesity alone. The increased risk of postpartum haemorrhage is usually attributable to associated medical complications, such as need for IOL, prolonged labour and mode of delivery. The RCOG recommends that "all women with a BMI $\geq$ 30 should have a plan for active management of the 3rd stage of labour and all women with a BMI $\geq$ 40 should have established IV access in labour".

Anaesthetic complications

Maternal obesity increases the risks of anaesthetic complications. These include a higher risk of epidural failure, impaired respiratory function with the use of spinal anaesthesia, risk of difficult intubation and obstructive sleep apnea making general anaesthesia difficult. The RCOG recommends an anaesthetic review for all women with a BMI $\geq$ 40 in the antenatal period and communication with the on call anaesthetist when a woman with a BMI $\geq$ 40 is admitted to the labour ward if delivery or operative intervention is anticipated.

Neonatal care

Studies report that infants born to mothers who are overweight or obese are more likely (up to 1.5 times) to need neonatal intensive care support and treatment for neonatal hypoglycaemia and jaundice.

Case 2

Jane is a 30-year-old para 1+1, with a BMI of 42 attended the hospital care at 14 weeks of gestation during her second pregnancy after 2 years of secondary infertility. She had a routine mid trimester ultrasound scan which was reported to be normal. She had an oral glucose tolerance test at 28 weeks of gestation which was reported to be normal.

At 32 weeks' gestation she developed pre-eclampsia and was initially managed with antihypertensive and close monitoring. She went into spontaneous labour at 38 weeks' gestation and had uneventful vaginal delivery of male infant weighting 3.6 kg. At the time of delivery it was noted that the baby had a prominent sacral dimple and subsequent investigation revealed spina bifida occulta.

On the third postnatal day, she was suspected to have developed deep vein thrombosis in her right leg. This was confirmed by the radiological investigations and she was started on anticoagulants for 6 months' duration. She also struggled to breastfeed her baby and discontinued it shortly after birth. Four weeks following her delivery, Jane was diagnosed with postnatal depression requiring psychiatric input from the hospital.

Case discussion

Preconception

Complications surrounding pregnancy caused by obesity are thought to start well before conception. Women who are

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