Labour and delivery in obese women

Dr Keith Allenby
FRCOG, FRANZCOG

The care of labour and delivery in obese women is becoming increasingly common in modern obstetric practice. It is clear that the frequency and magnitude of obesity is increasing.

There are many implications from this phenomenon which are clinical, theoretical and operational. Obstetricians will need to be fully equipped with the skills to understand and manage obese patients in the future.

Body mass index (BMI) is the measurement used for assessment of obesity. BMI has some weaknesses and, particularly when used in ethnic groups with large lean muscle mass, can be misleading and can overestimate total body fat. Obesity is considered to be a BMI greater than 30 kg/m^2 and morbid obesity is classified as a BMI greater than 40 kg/m^2. Ideally, a BMI recorded pre-pregnancy or early in the first trimester is used.

Unbooked patients and antenatal risks impacting on labour and delivery

It is important to consider the potential problems caused by obesity that will not have been identified in the antenatal period. A large UK study[1] showed that the odds ratio for having no antenatal care in the obese patient over BMI 30 kg/m^2 was 1.5. The risks of having had no antenatal care include a higher incidence of birth defects, especially neural tube defects and omphalocoele, although the data is conflicting. In addition, the incidence of hypertension is doubled for every 7 kg/m^2 rise in BMI.[2] In a Danish study[3], the incidence of diabetes was 3.4 higher than in those of normal weight. Weight gain between pregnancies similarly increased the incidence of gestational diabetes (GDM), while weight loss reduced the incidence.

Duration of pregnancy

Denison[4] *et al* have shown, in a large retrospective analysis, that the higher the BMI, the lower the chance of spontaneous labour before 42 weeks and the greater the incidence of postdate pregnancy. There was an increased likelihood of complications identified in the obese group.

Mechanism and duration of labour

Increased obesity is known to be associated with increased caesarean section rates. In addition, Nuthalapaty[5] *et al* demonstrated that there was an association between increasing BMI, caesarean rate and duration of labour. Characterisation of the delay in labour was demonstrated by Vahratian[6] *et al* when they showed that overweight women experienced delay more at 4 to 6 cm and the obese women at 7 cm. The prolongation of the first stage of labour was statistically significant in both groups. They conclude that 'it is critical to consider differences in labour progression by maternal pre-pregnancy BMI before additional interventions are performed.'

'BMI has some weaknesses and, particularly when used in ethnic groups with large lean muscle mass, can be misleading and can overestimate total body fat.'

Fetal monitoring and assessment

It is difficult in the obese patient to monitor the fetal heart with cardiotocography, ultrasound and even palpation of contractions or fetal lie and presentation can be very difficult. Intrauterine pressure monitoring is not routinely used to assess uterine activity as an alternative, but insertion of the catheter to facilitate this would be prohibitively difficult. Use of a fetal scalp electrode should be considered as soon as it is possible, to apply the clip if there is any difficulty monitoring the fetal heart rate (subject to the standard contraindications to application).

Figure 1. The technical challenges of ultrasonography in a patient weighing 260 kg.

Fetal macrosomia

Fetal macrosomia is a result of maternal insulin resistance leading to fetal hyperinsulinaemia (even if gestational diabetes is not present). The presence of gestational diabetes (GDM) increases this risk of macrosomia. The incidence of GDM increases dramatically in obese and morbidly obese patients with odds ratios of 2.6 and 4.0 respectively for the obese and morbidly obese groups.
It is the mechanical effect of this increase in weight independently that causes the mechanical problems in labour, especially shoulder dystocia, and appears not to be a direct manifestation of the maternal obesity alone.

Shoulder dystocia

Shoulder dystocia is a cause for concern to all clinicians providing care for women with obesity. Management requires the clinician to be able to perform manoeuvres, which in the obese patient can be increasingly difficult. With the extremely obese patient, it is a pure mechanical challenge even to be able to position the patient in the McRoberts' position and perform suprapubic pressure, as the patient's abdomen is very high and the legs are in direct opposition to the abdomen. Additionally, the size of the person providing suprapubic pressure needs to be considered and where necessary, the larger accoucher should perhaps be allocated this role.

The incidence of shoulder dystocia, however, is not increased due to the maternal size and in a study[7] of nearly 50,000 singleton births used as cases and controls, maternal obesity itself was not identified as an independent risk factor, after adjustment, for confounding variables. The increased shoulder dystocia rate is a direct function of the fetal macrosomia, which results from the metabolic environment of the obese woman. Similarly, diabetes and mid-cavity instrumental delivery are independent risk factors for shoulder dystocia, but prolonged second stage of labour and post dates pregnancy were not found to be so.

Caesarean section

Not only is the incidence of caesarean section higher with obesity, but the complexity and complications of the surgery itself are considerably greater than in non-obese women. The odds ratio for emergency and elective caesarean section[1] for women with a BMI greater than 30 kg/m^2 were 13.40 and 8.48 respectively. The difficulty of surgery seems to a degree to have an ethnic variance. In my experience, a caesarean section performed on a woman of European origin is significantly more difficult than on a Pacific Island woman of the same BMI. This probably reflects how BMI is a very inexact tool, as lean muscle mass in the patients was considerably different.

There is a surgical difficulty associated with the inability to identify surface anatomy. In extreme cases, a decision about whether to work above or below the pannus needs to be made. Leaving the abdominal apron down and operating above with either a transverse or midline incision can have the advantage of making access easier, making surgical assistance easier and allowing the wound to remain clean and dry. An additional advantage is that a head up tilt position will help hold the apron in place and the need to retract the apron of fat by the assistant is removed, so they can concentrate more specifically on exposing the surgical field for the unfortunate surgeon!

Similarly, the incidence of post-operative complication is going to be higher in the obese group compared to the non-obese group and this has been shown repeatedly, along with the high incidence of urinary tract infection. Venous thromboembolism is increased in obesity. The use of subcuticular sutures or drainage of subcutaneous tissues have been shown to reduce post-operative wound infection.

Vaginal birth after caesarean (VBAC)

The problems that led to the original caesarean section are usually still present in the second or subsequent pregnancy. It has been shown[8] that the chance of successful VBAC is 50 per cent less in an obese group than in a lower weight group. When pre-pregnancy BMIs were reviewed, those who were successful with VBAC had significantly lower weight gain in the pregnancy. It may be that further investigation is required into this question, with interventions aimed at preventing weight gain being used to increase the chance of successful VBAC. The same authors performed a cost benefit analysis of the VBAC and their conclusion was that a VBAC was more cost-effective only when it was successful, therefore, a planned VBAC group compared to a planned caesarean was similar. Again, in the current climate, this would require re-evaluation for the relevant local healthcare systems.

Perineal trauma and repair

There is little evidence detailing rates of perineal trauma in relation to BMI and practice varies so widely that this would be unreproducible. However, when trauma does occur, repair can be difficult for a number of reasons. The size of the patient often means the upper medial aspects of the thighs are opposed even when in lithotomy. Retraction to visualise the apex can be difficult and the use of retractors such as the Guardian Vaginal Retractor™ can aid access to enable suturing of trauma. See Figure 2.

Figure 2. The Guardian Vaginal Retractor™

Following repair, there is a risk of abnormal healing and infection again as a consequence of this physical opposition of traumatised tissues. Figures 3 and 4 (page 16) show this scenario with the pre-operative findings and the extent of the corrective surgery needed at a later date. The patient weighed 190 kg and had reached the point that she had apareunia as a consequence of her birth trauma, which lead to a 1 cm thick band of scar tissue.

Anaesthesia

Anaesthesia in obese patients is undoubtedly more complex. General anaesthesia has significant risks which are exacerbated by obesity and co-morbidities add to these complexities. Some doctors

recommend that every obese patient requires an anaesthetic review. A local policy should be developed with clear guidance as to when this is appropriate. A blanket policy of anaesthetic review for all obese patients would, in some areas, overwhelm the anaesthetic services. Early intrapartum assessment and insertion of epidural is advantageous, before the pain becomes too intense and allows time for insertion, as the procedure is considerably more difficult in the obese patient.

Even simple procedures such as IV access can be difficult in obese patients. On occasions, ultrasound identification of veins may aid these insertions.

Postpartum haemorrhage (PPH)

Postpartum haemorrhage occurs slightly more often in obese patients with an odds ratio of 1.39. The management of the postpartum haemorrhage, however, is complicated by the factors detailed above. Mechanically, management is difficult with even simple measures such as rubbing up a contraction or bimanual compression being difficult. If anaesthesia is required, this proves complicated and the surgery, if required beyond examination under anaesthesia (EUA), is difficult due to maternal body habitus. The increased circulating volume of the obese woman and the decreased incidence of anaemia, however, is one positive area with respect to PPH.

Logistics and practical considerations

Often, the biggest problem faced in the birthing unit is managing the practical aspects of labour care. Water birth and labouring in water is contraindicated in the obese group, as removing the patient from the pool in the event of an emergency is impossible without risking injury to the staff looking after her. Fetal monitoring is difficult.

Should shoulder dystocia occur, the positioning and moving of the patient is difficult. Hoists can be used but need to be specifically designed for the appropriate patient weight. Positioning staff high enough to be able to provide suprapubic pressure and find the correct place to apply it is often compromised.

Transfer of patients to theatre and between trolleys can be a major risk to the patient and staff. Falls can occur if appropriate manual handling techniques are not used. Devices to aid transfer are being developed and consideration needs to be given for such matters in the operational meetings for the delivery unit.

It is always important to be aware of the weight limitations for the delivery beds and theatre operating tables when obese patients are frequently cared for. Often, the thresholds are not as high as the weight of some of the patients.

Procedures that seem so simple in the normal-sized woman can be difficult with the obese patient. The simple act of performing a vaginal examination often requires three staff – one to hold each leg and one to do the examination. In times of midwifery staffing shortage, this can have an impact on other patients receiving care at the same time.

Figures 3 and 4. Perineal trauma and repair.

Breastfeeding

Following delivery, breastfeeding is advantageous in the obese patient as it aids weight. Unfortunately, it has been shown[1] that the incidence of breastfeeding on discharge from the hospital is reduced in the obese patient, with odds ratios of 0.86 for BMI 25 to 30 kg/m^2 and 0.58 for BMI greater than 30 kg/m^2.

Summary

There are some conditions which are not increased by obesity. Placental abruption, placenta praevia and the incidence of anaemia is lower in obese patients. However, the remaining complications of pregnancy, labour and delivery are considerably exacerbated in obesity. The obesity epidemic is affecting all areas of healthcare and will increasingly become a major financial burden for maternity services. Interventions need to be developed to try and address the issue of obesity in pregnancy, but without a significant governmental and societal change, there is little chance of the momentum of obesity reversing.

References

1. Sebire N, Jolly M, Harris J, Wadsworth J, Joffe M, Beard R, Regan L, Robinson S. Maternal obesity and pregnancy outcome: a study of 287213 pregnancies in London. *International Journal of Obesity* 2001; 25, 1175-1182.
2. O'Brien T, Ray J, Chan W. Maternal body mass index and the risk of preeclampsia:a systematic overview. *Epidemiology* 2003;14:368-74.
3. Rode L, Nilas L, Wøjdemann K, Tabor A. Obesity related complications in Danish single cephalic term pregnancies. *Obstet Gynecol.* 2005; 105:537-42.
4. Denison F, Price J, Graham C, Wild S, Liston W. Maternal obesity, length of gestation, risk of postdates pregnancy and spontaneous onset of labour at term. *BJOG* 2008; 115:720-725.
5. Nuthalapaty F, Rouse D, Owen J. The association of maternal weight with caesarean risk,labor duration and cervical dilation rate during labor induction. *Obstet Gynaecol.* 2004;103:452-6.
6. Vahratian A, Zhang J, Troendle J, Savitz D, Siega-Riz A. Maternal prepregnancy overweight and obesity and the pattern of labour progression in term nulliparous women. *Obstet Gynaecol.* 2004; 103:943-51.
7. Robinson H, Tkatch S, Mayes D, Bott N, Okun N. Is maternal obesity a predictor of shoulder dystocia? *Obstet Gynaecol.* 2003; 101:24-7.
8. Juhasz G, Gyamfi C, Gyamfi P, Tocce K, Stone J. Effect of body mass index and excessive weight gain on success of vaginal birth after caesarean delivery. *Obstet Gynecol.* 2005; 106:741-6.