

Supermorbid obesity in pregnancy

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Objective: We aimed to carry out an audit and service evaluation for women with supermorbid obesity to ensure that adequate planning is in place for intrapartum and post-delivery care, and to review delivery outcomes and complications.

Methods: Records of pregnant women with supermorbid obesity (body mass index ≥ 50) who delivered in Rotherham General Hospital, United Kingdom, between January 2018 and December 2019 were retrospectively reviewed. Body mass index was recorded at booking and repeated at 36 weeks. Glucose tolerance test was performed between 26 and 28 weeks of gestation. Antenatal anaesthetic review was carried out at around 36 weeks in the dedicated clinic, along with risk assessment for manual handling. Appropriate antenatal and postnatal thromboprophylaxis was given. Postnatal skin care assessment was performed. Intravenous antibiotics were given before caesarean section, and oral antibiotics were given for 5 days after caesarean section. The time of artificial rupture of membranes (ARM) in relation to the time of delivery was recorded, as were perinatal and neonatal outcome of delivery and complications.

Results: Of 4962 deliveries, 30 (0.6%) were by supermorbid obese women aged 20 to 34 years ($n=24$) or ≥ 35 years ($n=6$) who were primigravidas ($n=15$) or parity ≥ 1 ($n=15$). One woman had gestational diabetes mellitus; none had major antenatal complications or medical disorders. Of the 30 women, nine laboured spontaneously (8 vaginal delivery, 1 emergency caesarean section), 13 underwent induction of labour (6 vaginal delivery, 4 instrumental delivery, 3 emergency caesarean section), and eight had an elective caesarean section. The proportion of women delivering out of hours (20:30-08:30) was 33% if ARM was during 06:00-12:00 and 80% if ARM was during 12:00-18:00. Consultant was present in all caesarean sections, except for one performed by a senior trainee. All women received preoperative antibiotics before caesarean section. Oral antibiotics were given for 5 days postoperatively in all but one patient with caesarean section, with four receiving intravenous antibiotics for 24 hours. Nine (30%) women had minor PPH and one (3.3%) had major PPH related to uterine atony following an elective caesarean section. One (3%) baby was large for gestation (>90 th centile) and three (10%) were small for gestation (<5 th centile). There was no immediate admission to neonatal unit. Initial breastfeeding rate was 56%. All women with vaginal or instrumental delivery were discharged home by day 2, those with elective caesarean section by day 3, and those with emergency caesarean section by day 5.

Conclusion: We adhered to most auditable criteria. There is room for improvement in terms of review by anaesthetists in the clinic or on first admission in labour. We have developed a pathway to start the induction process towards the beginning of the week and earlier during the day. Healthcare professional should discuss potential risks and management options with women with obesity presenting for the first time during pregnancy. A brief intervention on weight management should be delivered in an effective and sensitive manner to help reduce the long-term burden of morbidity associated with supermorbid obesity.

Keywords: Labor, induced; Obesity, morbid; Pregnancy complications

Introduction

In the United Kingdom (UK), 21.3% of antenatal women are obese and only 47.3% have normal body mass index (BMI)¹. The prevalence of obesity in pregnancy in the UK has increased from 9% to 10% in the early 1990s to 16% to 19% in the 2000s¹.

The MBRRACE-UK reported that 34% of the women who died in 2015 to 2017 were obese and a further 24% were overweight². Obesity is independently associated with higher odds of dying from pregnancy complications. Obesity in pregnancy contributes to increased morbidity

and mortality for mothers and babies.

In 2010, the Centre for Maternal and Child Enquiries (CMACE) conducted the first nationwide survey of maternity services for women with obesity³. These women in pregnancy are burdened by comorbidities, complications, and poor outcomes.

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The UK-wide obstetric surveillance system reported that one in 1000 pregnant women in the UK had a BMI of ≥ 50 ⁴. According to the National Health Services Digital, in 2018 the highest levels of obesity were found in Yorkshire and Humber and West Midlands⁵. Rotherham is a town in South Yorkshire County. According to the Daily Telegraph, 75% of the population of Rotherham is overweight or obese, the highest of any city in the UK⁶.

Rotherham General Hospital has an annual delivery rate of nearly 2600. The challenges in the obstetric and anaesthetic care of supermorbid obese women prompted us to carry out an audit and service evaluation in this cohort of women to ensure that care is provided as per the standards based on the Royal College of Obstetricians and Gynaecologists (RCOG) guidance¹ (Table 1). We aimed to review our services to ensure adequate planning is in place for intrapartum and post-delivery care, and to review delivery outcomes and complications.

Methods

Records of pregnant women with supermorbid obesity (BMI of ≥ 50) who delivered in Rotherham General Hospital between January 2018 and December 2019 were retrospectively reviewed. BMI was recorded at booking and repeated at 36 weeks. Glucose tolerance test was performed between 26 and 28 weeks of gestation. Antenatal anaesthetic review was carried out at around 36 weeks in the dedicated clinic, along with risk assessment for manual handling. Appropriate antenatal and postnatal thromboprophylaxis was given. Postnatal skin care

assessment was performed. Intravenous antibiotics were given before caesarean section, and oral antibiotics were given for 5 days after caesarean section.

The time of artificial rupture of membranes (ARM) was recorded. It was divided into four slots: 06:00-12:00, 12:00-18:00, 18:00-00:00, and 00:00-06:00. The time of delivery, in particular, the number of women delivering out of hours (20:30-08:30), in relation to the time of ARM was investigated. It is our routine practice to use one cycle of Propess (10 mg Dinoprostone vaginal delivery system) or Rusch balloon for 24 hours in cases with unfavourable Bishop scores. In cases where ARM cannot be performed, a repeat 24-hour cycle of either method is used alternatively.

Rates of spontaneous vaginal deliveries, instrumental deliveries, and caesarean sections were compared against Confidential Enquiry into Maternal and Child Health (CEMACE) national data. Neonatal data (the number of large for gestation or growth-restricted babies, admission to special care unit, and initial breastfeeding) were collected, as were overall delivery outcome and any major intrapartum or postpartum complications.

Results

Of 4962 deliveries between January 2018 and December 2019, 30 (0.6%) were by supermorbid obese women aged 20 to 34 years (n=24) or ≥ 35 years (n=6) who were primigravidas (n=15) or parity 1 and above (n=15). Only one woman had gestational diabetes mellitus; none had major antenatal complications or medical disorders.

Table 1. Auditable criteria and percentage of women achieved

Audit criteria	Standard %	% (No.) of women achieved
Antenatal		
Record of body mass index at booking and at 36 weeks in handheld notes and electronic system prior to delivery	>90	100 (30/30)
Glucose tolerance test in pregnancy	>90	100 (30/30)
Antenatal anaesthetic review	>90	80 (24/30)
Risk assessment for manual handling in the third trimester	>90	80 (24/30)
Assessment for thromboprophylaxis and received of correct dose	>90	100 (30/30)
Postnatal		
Appropriate antibiotic prophylaxis		
Pre-caesarean section	>90	100 (12/12)
Post-caesarean section	>90	91 (11/12)
Postnatal thromboprophylaxis at correct dose	>90	100 (30/30)
Skin care assessment	>90	87 (26/30)

Table 2. Delivery outcomes and complications

Outcome	No. (%) of pregnant women with body mass index of ≥ 50 (n=30)	% in Confidential Enquiry into Maternal and Child Health
Induction of labour	13 (43)	36
Normal vaginal delivery	14 (47)	47
Instrumental delivery	4 (13)	5.8
Overall caesarean section	12 (40)	45
Emergency caesarean section	4 (13)	25.4
Elective caesarean section	8 (27)	19.6
Shoulder dystocia	2/18 (1.2)	-
Difficult access at caesarean section following failed trial	1/12 (8.3)	-
Readmission with wound infection following caesarean section	1/12 (8.3)	-
Return to theatre for atony	1/30 (3.3)	-

Table 3. Time of artificial rupture of membranes in relation to the delivery time

Time of artificial rupture of membranes	Delivery time
12:00-18:00	
13:45	02:29
14:15	07:30
14:15	19:56
17:00	05:00
15:46	20:54
06:00-12:00	
09:20	03:20
10:00	16:07
10:40	19:42
00:00-06:00	
04:50	08:51

Of the 30 women, nine laboured spontaneously, 13 had induction of labour, and eight had an elective caesarean section (Table 2). All women with spontaneous labour presented between 37 and 40 weeks; eight had vaginal delivery and one had emergency caesarean section for failure to progress. Of the 13 women who had induction of labour, six had vaginal delivery, four had instrumental delivery, and three had emergency caesarean section. Propess was used initially in three women and Rusch balloon in five. Nine underwent ARM between 06.00 and 18.00, except for one. The proportion of women delivering

out of hours (20:30-08:30) was 33% if ARM was during 06:00-12:00 and 80% if ARM was during 12:00-18:00 (Table 3). The indications for the eight elective caesarean sections included previous one or two caesarean sections and malpresentation.

A consultant was present in all caesarean sections, except for one, which was performed by a senior trainee. All women received preoperative antibiotics prior to caesarean section. Oral antibiotics were given for 5 days postoperatively in all but one patient with caesarean section, with four receiving intravenous antibiotics for 24 hours. It is our routine practise to use negative pressure dressings in women with BMI of ≥ 45 ; 10 of 12 women with caesarean sections received negative pressure dressings. Continuous subcuticular sutures were used in 10 caesarean sections (Monocryl, n=7; Prolene, n=3) and interrupted sutures with Prolene were used in two cases.

20 (66%) women delivered without primary postpartum haemorrhage (PPH) [blood loss of ≥ 500 ml], whereas nine (30%) had minor PPH (blood loss of 500-1000 ml) and one (3.3%) had major PPH (blood loss of >1000 ml) related to uterine atony following an elective caesarean section and had to be returned to theatre for intrauterine balloon tamponade.

26 (86%) babies were between 10th to 89th centile, whereas one (3%) were large for gestation (>90 th centile) and three (10%) were small for gestation (<5 th centile). There was no immediate admission to neonatal unit. Initial breastfeeding rate was 56%. All women with vaginal or

instrumental delivery were discharged by day 2, those with elective caesarean section by day 3, and those with emergency caesarean sections by day 5.

Discussion

Obesity is a trend described as ‘global epidemic’ by the World Health Organization⁷. Obesity is associated with increased number of pregnancy-related complications and serious adverse outcomes including miscarriage, fetal congenital anomaly, thromboembolism, gestational diabetes, preeclampsia, dysfunctional labour, PPH, wound infections, stillbirths, and neonatal deaths. It is also associated with higher rates of induction of labour and caesarean section and lower breastfeeding rate, compared with women with normal BMI³. Maternal obesity, in particular supermorbid obesity, poses management problems (relating to the increased risks of complications in pregnancy) and medical, surgical, and technical challenges in providing safe maternity care.

There has been an increased prevalence of supermorbid pregnant women at our hospital, with nearly 6/1000 women having a BMI of ≥ 50 . Healthy lifestyle advice is given and dietician referral is offered along with a patient information leaflet at initial visit. Glucose tolerance test is booked between 26 and 28 weeks. Growth scans are carried out from 28 weeks every 3 weekly until delivery. At 36 weeks, an appointment in the anaesthetic clinic is booked along with risk assessment for manual handling.

The rate of gestational diabetes is three-fold higher in obese women compared with those with normal BMI⁸⁻¹¹. In our cohort, the rate was quite low (3.3%, n=1) probably because most women were of younger age-group (20-34 years). Obesity and gestational diabetes in combination are associated with adverse pregnancy outcomes¹². Age ≥ 35 years is an independent risk factor for type-2 diabetes, gestational diabetes, and pregnancy-induced hypertension. In our cohort, the rate of pregnancy-related hypertensive disorders (pregnancy-induced hypertension, preeclampsia, essential hypertension) was 20%, which is much higher than the 1.9% in the general population. In our hospital, all women with BMI of ≥ 35 are assessed for the risk of developing preeclampsia based on the NICE criteria¹³ and receive 150 mg aspirin from 12 weeks gestation.

Obesity is a risk factor for thromboembolism, and risk assessment should be carried out at first antenatal visit, during pregnancy (if admitted or develop intercurrent problems), intrapartum, and postpartum¹, based on the RCOG guidance on thromboembolism.¹⁴

Risk assessment for manual handling is performed in the third trimester to determine any specific requirements for labour and birth in terms of patient factors, equipment, communication, building space, and organisational and staff issues¹⁵. Our hospital has a list of equipment with weight limits, which is a minimum requirement for maternity services within National Health Service Litigation Authority’s Clinical Negligence Scheme for Trusts maternity risk management standards¹. Postnatal skin care assessment is performed to identify early signs of pressure sores that can be worsened by immobility¹⁶.

Pregnant women with a BMI of ≥ 40 should have an antenatal consultation with an obstetric anaesthetist, so that potential difficulties with venous access, regional or general anaesthesia can be identified. An anaesthetic management plan for labour and delivery should be discussed and documented in the medical records. UK-wide obstetric surveillance system data showed that 25% of maternal cardiac arrests are related to anaesthesia and 75% of these women are obese¹⁷. On admission for delivery, venous access should be established early on in labour. An early epidural is advocated by Royal College of anaesthetists. An epidural top-up in a well-established epidural is the quickest way anaesthesia can be gained in a prompt and safe way for an emergency delivery. The epidural re-site rate increases with increasing BMI (17%), compared with the 3% in the control group¹⁸. The increased difficulties associated with provision of general and regional anaesthesia can lead to increased decision-to-delivery time, particularly when a category I or II caesarean section is required¹. In our cohort, general anaesthesia was not needed. Nonetheless, it is a challenge, with difficulties in airways management including difficult bag mask ventilation and failed intubation with higher risk of desaturation¹⁹ and postoperative atelectasis.

In our cohort, 30% of women laboured spontaneously, which is much lower than the 69% in the general population. The rate of induction of labour was 43%, which is double the rate in the general population of 20%. Caesarean sections accounted for 40% of all singleton deliveries, which is comparable with the 45% reported in the CMACE study group but is substantially higher than the 25% among the general maternity population in England. In the CEMACE study, each unit increase in BMI > 35 is associated with an increased risk of induction of labour and caesarean sections. Delay in ARMs leads to out-of-hours delivery, which is a challenge when emergency caesarean section is needed. It is advisable to have a consultant presence unless the registrar has competency. Obesity is a

risk factor for PPH6, and active management of labour is advisable¹.

In the CEMACE study group, women with a BMI ≥ 35 are more likely to stay in hospital for ≥ 7 days after childbirth, even after adjusting for the mode of delivery. However, our women were discharged at a maximum of 5 days after delivery.

Babies born to mothers with obesity are up to 1.5 times more likely to be admitted to a neonatal intensive care unit and twice as likely to be stillborn, compared with women with healthy BMI³. In our cohort, there was no stillbirth or immediate admission to neonatal unit. Women with obesity are less likely to breastfeed, possibly owing to social factors, difficulty in latching on, or endocrine disturbance. More than half of our women were able to initiate breastfeeding.

The risk of wound infection is higher in obese women than in healthy women, with an adjusted odds ratio of 2.24 (95% confidence interval, 1.91-2.64)¹⁰. A systematic review of randomised trials showed a significantly lower incidence of wound infections with antibiotic prophylaxis in the general maternity population²⁰. Although negative pressure dressings result in a reduced rate of surgical site

infections in non-obstetric populations²¹, evidence for their use in obese obstetric populations is insufficient^{22,23}. In obese pregnant women, the risk of surgical site infection reduces with interrupted suturing compared with subcuticular suturing, although the latter shows better short-term cosmetic results and less skin closure time^{24,25}.

Conclusion

Our hospital adhered to most of the auditable criteria. There is room for improvement in terms of review by anaesthetists in the clinic or on first admission in labour. We have developed a pathway to start induction process towards the beginning of the week and earlier during the day, with the aim of carrying out ARMs early in the morning to increase the chance of delivering during weekdays and within working hours. Healthcare professional should discuss potential risks and management options with women with obesity presenting for the first time during pregnancy. A brief intervention on weight management should be delivered in an effective and sensitive manner to help reduce the long-term burden of morbidity associated with supermorbid obesity.

Declaration

The authors have no conflict of interest to disclose.

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