



Obesity in Obstetrics, New Challenges and Solutions Using Abdominal Fetal ECG

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Abstract

Obesity is now an important health problem and pregnancy coupled with obesity can result in the pregnancy being classified as high risk. Careful and close monitoring is therefore necessary. This article highlights some of the problems with Doppler ultrasound (CTG), in monitoring obese mothers, and how by using the passive technology of fetal ECG monitoring the quality of care in relation to fetal heart rate monitoring to this cohort can be improved. A study of 120 pregnancies, ranging from a body mass index (BMI) from 16 to 44, with 22 Patients with a BMI above 30, showed that obesity did not affect the success rate of the fetal heart rate (FHR) monitoring.

Keywords: Obesity; Pregnancy; Doppler Ultrasound; Fetal ECG; Long-term Monitoring.

Introduction

Obesity is emerging as an important global health problem. In the UK population 33% of women are currently overweight (BMI >25) and 23% (BMI>30) are obese a total of 56% over the recommended BMI (Royal College of Obstetricians and Gynaecology Oct 2006). Obese pregnant women are at high risk throughout the antenatal, intra-partum and post-partum period. According to Confidential Enquiries into Maternal and Child Health, (CEMACH), The Perinatal Mortality 2005 Report reveals that 'approximately 30% of mothers who had a stillbirth or neonatal death were obese. Obese women spend an average of 4.83 more days in hospital and the increased levels of complications in pregnancy and interventions in labour represent a fivefold increase in cost of antenatal care' (Galtier –Dereure et al, 2000) cited in CEMACH.

All current non invasive methods of screening for and monitoring an at risk fetus involve ultrasound (strictly speaking ultrasound is an invasive technique), which unfortunately has a very poor penetration in

fat tissue. At the moment there is not enough evidence to evaluate the effectiveness of these methods in obese pregnant women.

However, Jane E Ramsey et al in her article 'Problems of Obesity in Obstetric Care' (2006 BMJ) recognised that, 'external electronic fetal monitoring can be problematic and that women may have reduced awareness of fetal movements'. Ultrasound to measure growth, arterial Doppler and CTGs are all difficult to perform successfully in obese women.

The Monica AN24 is a new CE approved method to record the maternal and fetal heart rate using abdominal ECG monitoring. It is a passive technology, non invasive and as adipose tissue is not a barrier to the conduction of electrical signals, it can provide a useful and valuable tool to clinicians in monitoring fetal well-being in obese mothers.

Defining Obesity

The World Health Organisation's latest projections indicate that globally in 2005:

- approximately 1.6 billion adults (age 15+) were overweight;
- at least 400 million adults were obese.

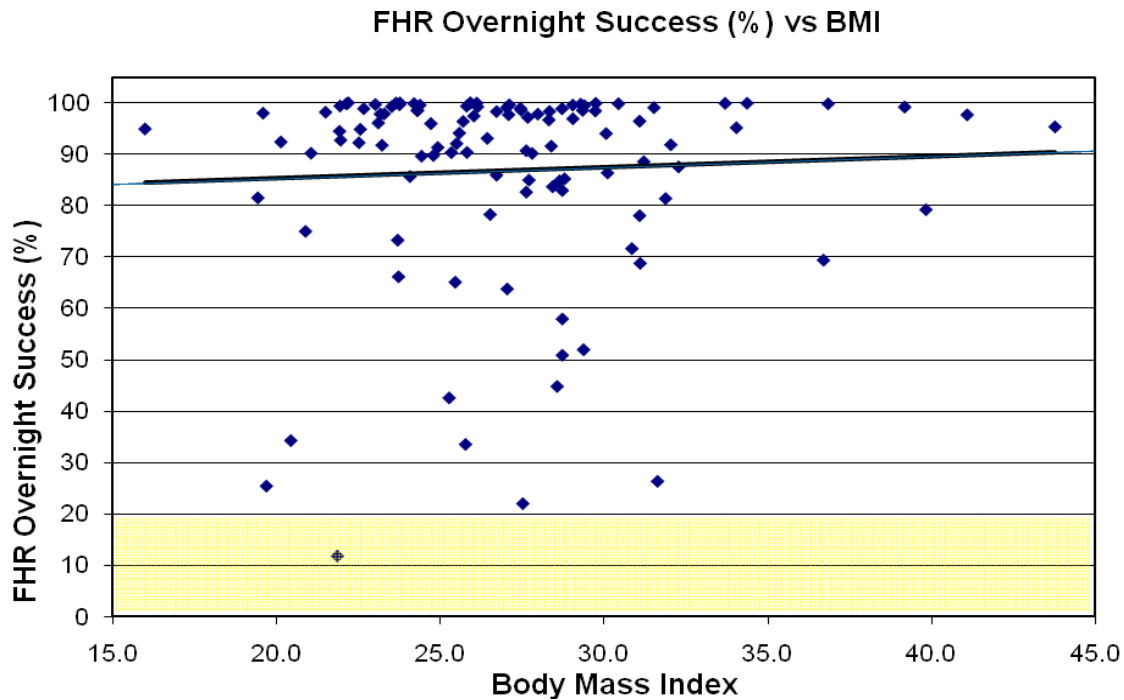


Figure 1: BMI does not impact on FHR monitoring success.

WHO further projects that by 2015, approximately 2.3 billion adults will be overweight and more than 700 million will be obese. At least 20 million children under the age of 5 years were overweight globally in 2005. Once considered a problem only in high-income countries, overweight and obesity are now dramatically on the rise in low and middle income countries, particularly in urban settings.

Even though the governments have put in place initiatives to tackle childhood obesity, the increase in prevalence has a knock affect in future obstetrics. We therefore need to ensure standards are met for obese women in the future in relation to fetal monitoring.

The calculation of Body Mass Index

Body Mass Index (BMI) is a simple index of weight-for-height that is commonly used to classify underweight, overweight and obesity in adults. It is defined as the weight in kilograms divided by the square of the height in metres (kg/m²). For example, an adult who weighs 70kg and whose height is 1.75m will have a BMI of 22.9.

The Antenatal Period

Obese mothers are at a higher risk of hypertension, diabetes, and stillbirths. This cohort of women therefore require more monitoring in their pregnancies, also in obese women, abdominal palpation for fetal assessment of growth, fetal presentation and position can be very difficult. The electrodes used to monitor Fetal ECG are always placed in same position and require no knowledge of the fetal position..

Clinical Trial

As part of a rigorous clinical trial program independently managed by Mediqol (www.mediqol.com/clinical.shtml) using both GCP and ISO14155 guidelines, an MDD approved clinical investigation of the Monica AN24 abdominal fetal and maternal ECG monitor was undertaken in the Department of Perinatology, Fertility and Gynaecology, University of Utrecht, Holland. The lead clinical investigator was Professor G. Visser and the work was undertaken by Dr Margo Graatsma. The trial was approved by Utrecht University Ethical Committee.

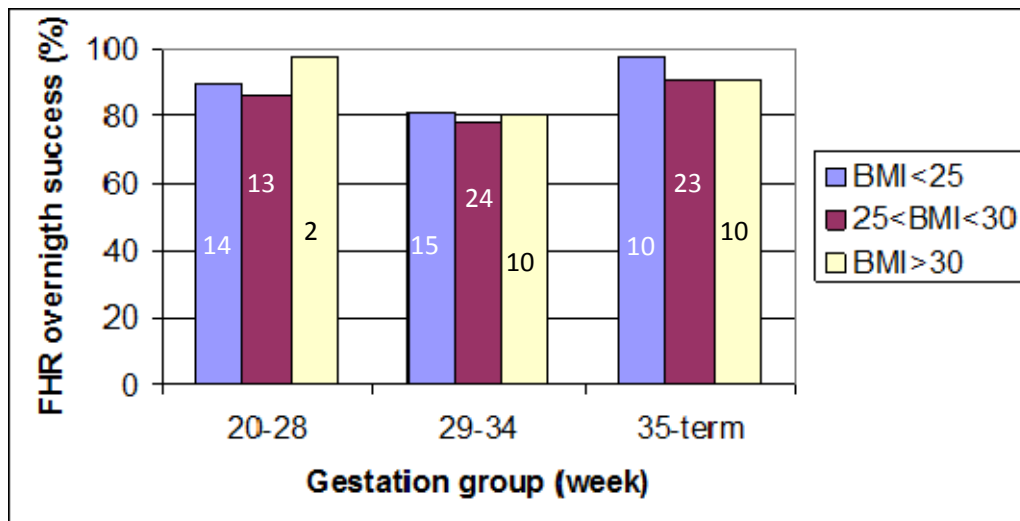


Figure 2: Overnight FHR success by Gestation and BMI. Number in column is the number of patients by gestation and BMI

120 mothers were recruited all with singleton pregnancies, the gestation of pregnancy varied between 20 to 40 weeks as listed in Table 1. The body mass index was recorded for 111 woman participating in the clinical trial, the BMI ranges varied from 16-44. All recruits provided written informed consent.

Table 1: Patients recruited by Gestational Age and BMI

Gestation (weeks)	No of Patients	Average BMI	StdDev BMI
20 – 22	10	26.7	6.6
23 – 25	10	25.7	2.6
26 – 28	10	26.0	3.8
29 – 31	20	28.7	5.7
32 – 34	20	25.6	4.3
35 – 37	25	28.0	2.8
38 - term	25	27.3	5.1
TOTAL	120	27.0	4.6

The AN24 monitor was attached to the mother for an average of 15 hours (3hrs – 18hrs). Five standard high quality Holter ECG electrodes (Ambu VLC-00) were placed on the abdomen in the same position on each women, the only differentiating factor was the distance between electrodes in relation to the gestation of the pregnancy. The recording was either in the Patients home or the hospital. All but 6 of the 120 recordings, as judged by the lead clinical

investigator were clinically acceptable with at least one 1hr period of high quality FHR data. Body mass index did not appear to significantly affect the ability to obtain a successful recording, see Figure 1 and Figure 2 above.

Conclusion

The increased incidence of obesity may be a reflection of the choices made by the individual or the society they live in. Whatever the cause there are many health initiatives in place to tackle this growing problem.

As clinicians it is imperative to ensure that the provision of care to all pregnant women should be of a high-quality regardless of BMI. Maternity units should ensure that a protocol is in place for obese women and also have a multidisciplinary approach, always ensuring that respect and dignity is maintained as well as a non judgmental approach.

The AN24 Maternal and Fetal ECG monitor has bridged one gap for clinicians in that it monitors the fetal heart rate offering clinical quality FHR recordings regardless of maternal BMI (BMI>44 were not evaluated in this trial).

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