DIABETES AND PREGNANCY

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In the United Kingdom, about one pregnancy in every three hundred occurs in a woman with insulin dependent diabetes mellitus (IDDM). This is the commonest pre-existing medical condition occurring in pregnancy and means that, between the Lancaster and Kendal hospitals, we would expect to see eight or ten IDDM pregnancies annually. Although it is rare for IDDM to be recognised for the first time in pregnancy, this can happen and should always be borne in mind – particularly if hyperglycaemia occurs early in the pregnancy.

Most women who develop hyperglycaemia in pregnancy return to normal after delivery. The condition is known as gestational diabetes mellitus (GDM). There is no doubt that GDM can affect foetal outcome and that if followed up for twenty or more years, about two-thirds of the mothers will have developed non-insulin dependent diabetes mellitus. These women therefore require occasional screening for diabetes over the years. There remains some controversy about when to make the diagnosis of GDM and how aggressively to treat it (see below). The incidence of GDM varies from under 1% to over 10% in various ethnic groups around the world. In Britain, the incidence is between 1 and 4%, most reports suggesting that between 6 and 9 times as many pregnancies will be affected by GDM than IDDM.

The St Vincent Declaration aims to achieve pregnancy outcome in the diabetic woman that approximates to that of the non-diabetic woman. This has been shown to be a practical target in a number of centres.

EFFECTS OF DIABETES MELLITUS ON THE FOETUS

Maternal nutrients cross the placenta and cause increased foetal growth when in excess. Not only glucose, but also amino acids and triglycerides will be responsible. The parts of the body most affected are fatty tissue, the heart and the liver. Although GDM is often not diagnosed until the end of the second trimester, foetal scanning often shows that the foetus has been 'large for dates' since the end of the first trimester. Treatment is aimed partly at minimising this effect.

Congenital malformations

In the general population, significant congenital malformations are found in <2% of babies. In poorly controlled IDDM patients this rate reaches 5-10%. The main problems seen with diabetes are neural tube defects, heart and renal abnormalities. There is no specific defect, but abnormalities tend to be more severe and more frequently multiple and/or fatal. These abnormalities relate to hyperglycaemia around conception and particularly between the fifth and ninth week of gestation, usually before the mother knows she is pregnant. For this reason, a planned pregnancy with pre-conception counselling and diabetic

control is needed. In well-controlled IDDM patients the rate of malformation is around 2%. All fertile diabetic women should be advised to contact the combined diabetic pre-pregnancy clinic for advice before starting a pregnancy and they should receive this information before pregnancy is a possibility. They are often very relieved to know that, with proper care, the risks of pregnancy are usually comparable to those of the general population.

Problems in Pregnancy

IDDM is a high risk state for increased spontaneous abortion, ketoacidosis, pre-eclampsia, premature labour, polyhydramnios, maternal infection, late intra-uterine death and foetal distress. Ketosis is particularly important as it can result in foetal death. Some of these risks are also present in GDM.

Placental blood flow can be reduced by hyperglycaemia. A diabetic mother's baby is more likely to be hypoxic and acidotic in late pregnancy, which may be aggravated by cardiomegaly. This is likely to cause some of the unexpected late stillbirths, usually after 36 weeks. There is no evidence that maternal hypoglycaemia causes foetal problems in the human. It is also becoming clear that many of the tests conventionally used to assess foetal well-being in the third trimester, for example biophysical profiling and umbilical artery Doppler, cannot be interpreted in the same way as in non-diabetic pregnancies.

Pregnancy may also cause significant deterioration of maternal diabetic retinal and renal disease, particularly in those women with long-standing poorly controlled diabetes. This needs careful discussion at the pre-pregnancy visits and monitoring through the pregnancy.

Problems at delivery

There is an increased risk of prematurity in diabetic pregnancy related to polyhydramnios and pre-eclampsia (above). However, the delivery of a very large (macrosomic) baby may be technically difficult with the most serious risk being of shoulder dystocia. This condition, in which the head is delivered and the shoulders cannot follow it through the pelvis is, in my opinion, the most frightening condition in the whole of obstetrics.

The mother is maintained on an insulin/dextrose (10%) infusion through delivery.

Neonatal effects

The immediate effect on the baby is of rebound hypoglycaemia if its pancreas has been overstimulated by a heavy glucose load from the mother. There is often polycythaemia, which increases the chance of jaundice. The baby's lungs may be less mature for any given gestation so that respiratory distress is more likely.

Longterm risks

The likelihood of a baby born to a mother with IDDM developing diabetes later in life is only slightly above that for the normal population. The risk is highest if both parents have IDDM. If only one parent is affected, fathers provide a higher risk than mothers. The reported incidence is 2-6%.

Local audit findings

Teams consisting of obstetricians, paediatricians and physicians have audited diabetic pregnancy in the last two audit cycles. Both have shown that results can be improved. The second audit confirmed a continuing problem, with a lack of pre-conception counselling leading to poor control and often late booking. Very few patients with GDM are being identified. Mothers have poor knowledge of the risks and treatment plans in pregnancy. There are deficiencies in both the quality and quantity of information reaching the women. For example, many women feel that they are constantly being criticised by the staff. Concerns about hypoglycaemic attacks resulting from tighter control were frequently expressed, particularly by women with other small children. It is also recognised that separate antenatal and diabetic clinics lead to an increased number of outpatient attendances that many may find difficult to keep. The following recommendations were made:

- All women with diabetes should be encouraged to have pre-conception counselling.
- All mothers should have an explanation of the unit's policies at the time of booking.
- Communication between doctors, staff and mother should be improved and a consistent story given.
- Policies relating to the handover of adolescents to the adult clinic team could be reviewed to include general information on possible future pregnancy and pre-pregnancy care.

A NEW LOCAL DEVELOPMENT

The combined diabetic pregnancy and pre-pregnancy clinic

The recent appointments of David Walmsley (Diabetes and Endocrinology) and of David Burch (Obstetrics and Gynaecology), followed by the increase in diabetes specialist nurses (DSNs) in Lancaster to two whole-time equivalents, enabled us to start a combined diabetic pregnancy and pre-pregnancy clinic in the second week of September, 1996. This takes place at the Royal Lancaster Infirmary on Tuesday afternoons, currently on Ward M4 of the Maternity block (see Table 1 for referral patterns). A midwife, diabetes specialist nurses and dietician also attend the clinic. This team is happy to see women for preconception advice, antenatal and postnatal care. Women from the Kendal area should normally go to Lancaster for all obstetric visits. In a straightforward case, this would be at booking; at the 19-week complication scan with discussion of results; and all visits after 28 weeks including any additional visits. All newly-diagnosed patients with gestational diabetes should be referred to the next clinic in Lancaster. If there have been previous obstetric problems, or if there are obstetric issues to discuss, a pre-pregnancy visit may be useful too. Most pre-pregnancy visits and intermediate visits for diabetic control will remain at

Consultants: David Burch David Walmsley		Obstetrician Diabetes & Endocrinology	Sec: 583808 Sec: 583322
Diabetes Specialist	Karen Scholey Margaret McCaskie Sue Grime	Lead for developments Kendal	Office: 583715
Midwife	Amanda Plackett	Clinic and ward M3	Tel: 3840 & 3830
Dietician	Paul Dunstan		
Combined Clinic	Ward M4	Booking	Maternity OPD Reception: 583861/2 Fax: 583585
Ward (Inpatient)	Ward M3	Tel: 3830	
Newly pregnant IDDM Arrange an OPD in the next clinic by telephone (Maternity OPD reception). Send a letter with the patient or a fax to follow.			
Newly diagnosed GDM Arrange an OPD in the next clinic by telephone (Maternity OPD reception). Send a letter with the patient or a fax to follow.			
IDDM or previous GDM patients wishing pregnancy By letter to Dr Walmsley or Mr Burch.			
Ketosis Admit to ward M3.			

Table 1 – Staffing, locations and referral routes for the combined clinic.

Westmorland General Hospital with Dr Walmsley and Sue Grime, the diabetic specialist nurse. The midwifery staff at Helme Chase are available, but are not trained in diabetes care, and some other services such as dietetic are not available at the same visit. This will reduce the number of OPD attendances and improve the quality of service and education by having all obstetric visits in the combined clinic. Occasionally, patients may have great difficulty in reaching Lancaster and in these situations alternative arrangements may be needed. Even so, we would like to keep third trimester visits in Lancaster. All hospital admissions and deliveries should be in Lancaster. Table 1 gives the arrangements for making appointments, but pre-pregnancy and diabetic follow-up at Kendal can be arranged through Sue Grime or Dr Walmsley's secretary.

Treatment targets are given in Table 2 and are the same for IDDM and GDM patients. All women should take folic acid supplements through preconception and the first trimester. We hope that, in addition to improving other outcomes, the time of delivery will approach term more closely, the Caesarean section rate will decrease and breast-feeding increase with these measures.

Controversy remains about how to screen for and diagnose GDM. Previously, glucose tolerance tests were performed on women who had risk factors in their history or on examination. Screening in this way alone has proved to be rather haphazard and confusing, missing many patients. We have adopted a policy of universal screening, as recommended by various national and international expert panels. Several points need to be remembered when applying this policy. The normal range of fasting plasma glucose is much lower in pregnant than non-pregnant women and glycosuria with normal plasma glucose levels is common due to a lowering of the renal threshold for glucose. Further, the screening programme should identify plasma glucose levels

Screening for GDM	Plasma Glucose	
	Pre-meals:	3.5 - 5.5 mmol/l
	1½-2 hours post-meals:	<7.0 mmol/l
	HbA _{1c}	Approaching 5.0%
Screening for GDM	Urinalysis for glucose	Every antenatal visit
	Plasma glucose (lab) (timed from last food)	a) 1+ or more glycosuria b) at booking and 28 weeks
	75g OGTT (lab glucoses) unless diagnostic sugars already achieved	a) Glucose fasting or >2 h from food is above 5.5 mmol/l b) Glucose up to 2 h from food is above 7.0 mmol/l
Diagnosis of GDM	Fasting plasma glucose	>5.5 mmol/l
	2 h OGTT glucose (high values may not need an OGTT: if in doubt, contact Dr Walmsley or Mr Burch).	>9.0 mmol/l

Table 2 – Targets for control, and a screening programme with diagnostic values for identifying GDM.

associated with adverse foetal outcome or future risk of diabetes in the mother. Strategies may vary amongst practices with different ethnic mixes at differing risk of GDM. The suggested protocol is taken from the Pregnancy and Neonatal Subgroup Report for the Implementation of the St Vincent Declaration in Scotland, 1995. Note that the 95th centile (3 standard deviations) for plasma glucose two hours after a 75g

OGTT is used, as recommended by the Diabetic Pregnancy Study Group of the European Association for the Study of Diabetes. The lower WHO criteria would diagnose 15% of women as GDM, which is clearly too many!

DIABETIC EMERGENCIES DURING PREGNANCY

Hypoglycaemic attacks

Because of the tight control necessary to achieve good pregnancy outcomes, hypoglycaemic attacks do occur more often, but are not inevitable. We recommend the use of hypostop gel (to carry in the handbag), and provide glucagon kits with instruction to the partner or other close relative about dealing with these attacks.

Ketonuria

The finding of ketones in the urine of a pregnant diabetic woman should be treated as an emergency because the foetus is very sensitive to ketoacidosis and can die as a result at any stage of the pregnancy. Ketones should be tested for if the blood glucose is high, if the patient is vomiting for any reason, or if she is unwell. If the glucose is up, an additional 6 units of soluble insulin should be taken immediately and the urine rechecked. If more than a trace of ketones persists she should be admitted as soon as possible to ward M3 for a dextrose (10%) and insulin infusion to clear the ketones whilst she is investigated and treated for the underlying cause (often a UTI). If in doubt, ring promptly for advice.