ABCD position statement on screening for gestational diabetes mellitus

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ABSTRACT

Gestational diabetes mellitus is an increasingly common medical problem seen in pregnancy. A randomised clinical trial, published in 2005, showed improved perinatal morbidity and mortality in pregnancies of women with actively managed gestational diabetes. Prior to 2003 the evidence base for screening and treating all women with gestational diabetes was not strong enough for the National Institute for Clinical Excellence (NICE), in its 2003 antenatal guidelines, to recommend universal screening for gestational diabetes. As we await the review of these original 2003 NICE guidelines we offer a pragmatic approach for the detection of glucose intolerance in pregnancy.

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KEY WORDS

gestational diabetes; screening; macrosomia; guidelines

Introduction

Gestational diabetes mellitus (GDM) is defined as any degree of glucose intolerance that is first recognised during pregnancy.[1] The definition does not depend on the treatment required, nor whether the diabetes resolves after delivery. Gestational diabetes is therefore a heterogeneous condition. Type 1 and type 2 diabetes that present in pregnancy are strictly classified as GDM, although clinically are best considered separately.

As the background prevalence of type 2 diabetes (T2DM) increases, more women diagnosed with GDM will actually have undiagnosed T2DM. The risks to pregnancy associated with T2DM and type 1 diabetes (T1DM) are similar. In London between 2002 and 2003 T2DM accounted for 45% of all women with pre-gestational diabetes (http://www.cemach.org.uk/). The prevalence of gestational diabetes reflects the background prevalence of T2DM in that population, as GDM often progresses to T2DM.[2,3] Due to the increased prevalence of overweight and obesity in the general population there has been an increase in T2DM in women of childbearing age, with a corresponding increase in the prevalence of GDM. Many antenatal clinics in the UK serve populations with ethnicities that have a high prevalence of both pre-gestational T2DM and GDM.

The metabolic disturbances associated with GDM include fetal hyperinsulinaemia that predisposes to fetal macrosomia secondary to excess fat disposition. There are both short-term mechanical and longer-term physiological complications of fetal macrosomia.[4,5] Macrosomia is associated with an increased risk of birth trauma to both mother and child. Shoulder dystocia is poorly predicted and can be associated with significant long-term morbidity. Gestational diabetes is associated with neonatal hypoglycaemia, due to inappropriate fetal insulin secretion extending into the neonatal period. Transient neonatal jaundice, polycythaemia and hypocalcaemia can also occur. Intrauterine death due to stillbirth is the main cause of perinatal mortality and transient neonatal hypoglycaemia the main cause of perinatal morbidity.

Screening for diabetes in pregnancy

The National Institute for Clinical Excellence (NICE) document on antenatal care for healthy pregnant women in 2003 included the recommendation not to routinely screen for GDM, stating that 'the evidence does not support routine screening for gestational diabetes mellitus and therefore it should not be offered'. At the time of this recommendation in 2003 it was not clear whether treatment of GDM favourably improved pregnancy outcome.[6] This recommendation did not address the fact that a screening strategy for GDM would also detect previously undiagnosed pre-gestational diabetes for which there is an evidence base that intensive management benefits pregnancy outcome.

Screening for GDM can be either selective or universal. Selective screening for GDM based on recognised risk factors invariably underdiagnoses women among high-risk populations. In one high-risk USA population a similar proportion of women with diabetes in pregnancy had GDM risk factors as those without.[7] Within high-risk antenatal populations a universal approach to screening for GDM is the only reliable way of identifying women with

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GDM. A pragmatic approach to deciding if an antenatal population is at high risk of diabetes in pregnancy could be based on a GDM prevalence of >2% when universally screened. (Table 1.)

A heightened awareness of T2DM in women of childbearing age is now required based on the rapid increase of its prevalence within this age group. Ideally, T2DM should be identified prior to pregnancy and pre-pregnancy counselling given, appropriate treatment started and glycaemic targets reached before any pregnancy.

Random plasma glucose should be measured in the antenatal booking clinic where there is a high local prevalence of T2DM. Again, a pragmatic approach to deciding if an antenatal population is at high risk of undiagnosed T2DM in pregnancy could be based on a prevalence of known cases >0.25% (i.e. >5/2000 women have pre-gestational T2DM). (See Table 1.)

Table 1. Identifying glucose intolerance within the antenatal clinic: a pragmatic approach. Part 1: assessment

Assess background prevalence of GDM and type 2 diabetes:	
If GDM prevalence >2% *or* If T2DM prevalence >0.25%	Consider universally testing Consider universally testing *and* universally random booking glucose*
If GDM prevalence <2% *and* If T2DM prevalence <0.25%	Consider screening using known risk factors**

* If random booking glucose is >7mmol/L test for GDM at time of booking and, if negative, again at 28 weeks.
** Known risk factors: age >30 yrs, BMI >30kg/m^2, family history of diabetes or previous GDM, non-white ethnic group, poor obstetric history.

Screening for GDM

In deciding a screening policy a decision needs to be made by individual antenatal units whether to provide a screening test followed by a diagnostic test if positive (i.e. a two-stage procedure) or whether to go straight to a diagnostic test (i.e. a one-stage procedure). Again, which of these options is best for a given unit will depend on the background prevalence of GDM/T2DM. In low-risk populations a two-stage procedure (i.e. when <20% of screening tests are positive) is likely to be cost effective and easier to provide, given the screening test is performed non-fasting. However, in high-risk antenatal populations (i.e. when >20% of screening tests are positive) going straight for a diagnostic test may well be cost effective, and managerially easier to administer than organising multiple recalls for a second test. Doing this also allows clinical management to begin two to three weeks earlier. (See Table 2.)

The most widely used and validated screening test relies on the measurement of plasma or serum glucose one hour following a 50g oral glucose load (glucose challenge test or GCT),[8,9] performed at around 27–28 weeks' gestation. The GCT can be performed in the fasted or fed state. A positive test result is a one-hour plasma glucose value above 7.8mmol/L, when a diagnostic test is then required to confirm the diagnosis. This screening test identifies approximately 80% of women who have GDM confirmed on an oral glucose tolerance test (OGTT). If this screening test is negative, persistent glycosuria or excess fetal growth later on in pregnancy should not preclude repeating this test.

Women with a history of polycystic ovaries (PCO) should be considered as a high-risk group. Ideally, these women should have a glycaemic assessment prior to pregnancy and again in early pregnancy. Some women will conceive while taking metformin and a decision to continue on this medication during early pregnancy needs to be discussed, given that trial data on metformin's safety in pregnancy are still awaited. A diagnostic 75g OGTT should be performed on all women with PCO at 27 weeks, if GDM has not been identified earlier.

Diagnosis of GDM

The diagnosis of GDM should be based on a 75g OGTT performed in the fasted state. T2DM and GDM are characterised by a relatively higher post-prandial than fasting glucose value, and hence using only a fasting value is insufficient. A fasting glucose value >6.0mmol/L and a two hours post-load value >7.8mmol/L defined the glycaemic criteria for GDM in ACHOIS (Australian Carbohydrate Intolerance Study).[10] This study represents the only true

Table 2. Identifying glucose intolerance within the antenatal clinic: a pragmatic approach. Part 2: screening/diagnostic tests

Deciding on either a two-stage (screening and diagnostic) test for GDM or a one-stage diagnostic test for GDM at 28 weeks:	
If <20% of 1-hr 50g glucose challenge tests (GCTs) are positive	Consider screening GCT at 28 weeks* Followed by 75g OGTT on all positive results
When >20% of 1-hr 50g GCTs are positive	Consider diagnostic 75g OGTT at 28 weeks (using 2-hr value only if necessary)**

* A positive GCT when 1-hr glucose is >7.8mmol/L.
** A positive 75g OGTT when fasting glucose is >6.0mmol/L or 2-hr glucose is >7.8mmol/L.

randomised clinical trial of GDM published and it showed that active management of GDM improved pregnancy outcomes. In this study, women who fulfilled the World Health Organization criteria for diabetes were excluded.

In 2007, the results of the Hyperglycaemia and Adverse Pregnancy Outcome (HAPO) Study will be published. This study aims to clarify the association of maternal glycaemia, less severe than overt diabetes mellitus, and pregnancy outcomes. It is an observational study of 25 000 women (multi-centre and multi-national study) who have had a 75g OGTT between 24 and 32 weeks' gestation.[11] Women are excluded if their fasting plasma glucose is >5.8mmol/L or their two-hour 75g OGTT plasma glucose is >11.1mmol/L, otherwise the results of the OGTT are unknown to their heath care providers. Women are, however, un-blinded either if they develop hyperglycaemic symptoms or if a random plasma glucose performed between 34 and 37 weeks is ≥8.9mmol/L. It is hoped that this study will define the level of glycaemia using a 75g OGTT that is associated with an increased risk of an adverse pregnancy outcome.

Management of GDM

The ACHOIS results were not available in 2003 when the NICE antenatal guidelines were published.[10] In ACHOIS, GDM was defined as a two-hour plasma glucose between 7.8mmol/L and 11.1mmol/L on a 75g OGTT. In this trial, 1000 women with GDM were randomised to receive dietary advice, blood glucose monitoring and insulin therapy as required, or routine antenatal care. The rate of serious perinatal mortality and morbidity defined as death, shoulder dystocia, bone fracture, and nerve palsy was reduced in the intervention group. No gradation of glycaemia against morbidity was presented in the ACHOIS study in which 34 women needed to be screened and managed to prevent one serious perinatal complication. On current clinical evidence, active management of GDM has now been established as a two-hour glucose between 7.8mmol/L and 11.1mmol/L on a 75g OGTT. There is currently no evidence of benefit in measuring the one-hour value of the OGTT.

Management of GDM should focus not only on glycaemic control but also on weight management. Women who are clinically obese should aim to minimise weight gain in pregnancy. Individualised nutritional counselling is recommended for all women with GDM. Total calories and type of calories need to be addressed. When body mass index is >30kg/m^2, calories should be restricted to 20kcal/kg/day. This level of dietary restriction improves glycaemia and maternal triglyceride levels without increasing ketonuria.[12] Women who do not have any obstetric or medical contraindication should be encouraged to undertake moderate degrees of daily exercise, such as a 20-minute walk, as this can improve post-prandial glycaemia.

All women should perform home glucose monitoring. Urine glucose monitoring is unreliable for monitoring glycaemic control in GDM. The glycaemic targets for GDM should be the same as those for women with pre-gestational diabetes. Fasting glucose persistently >5.8mmol/L or post-prandial glucose persistently >8mmol/L suggest insulin should be considered when lifestyle measures alone fail to maintain these targets. For women with GDM treated with insulin, evidence suggests that the insulin dose should be adjusted on the basis of glucose measurement taken one hour rather than two hours post-prandially.[13]

The obstetric management of women with GDM includes greater fetal surveillance. The fetal growth and liquor volume should be assessed serially, every three to four weeks, by ultrasound starting from 28 weeks. Abdominal circumference should be charted to look for evidence of accelerated fetal growth. Evidence of asymmetric excessive fetal growth and polyhydramnios are obstetric indications for the consideration for insulin treatment in women with GDM.

Insulin treatment for GDM should be started once glycaemic targets cannot be met by lifestyle intervention alone. There is no evidence base for the use of prandial insulin analogues for GDM; however, they are now widely used and appear safe[14] – in addition, NovoRapid has recently received a licence for use in pregnancy. In the UK, oral hypoglycaemic agents are not recommended for use in pregnancy, although glibenclamide and metformin appear to be safer than previously thought.[15,16] However, whether these oral agents can achieve as good a glycaemic control as insulin therapy in GDM is not known. A prospective, randomised controlled trial comparing metformin with insulin in women with GDM (the MiG trial) is currently underway in New Zealand and Australia and the results of this trial are expected in late 2007.

The management of women with GDM extends to the neonatal period. All neonates should be monitored for neonatal hypoglycaemia and other transient metabolic problems.

Following a GDM pregnancy, women have an increased lifetime risk of T2DM. Therefore, all women should receive advice on making the necessary lifestyle changes that are known to reduce the risk of progres-

Key points

- Both gestational diabetes mellitus and pre-existing type 1 or type 2 diabetes mellitus (T1DM/T2DM) are common and a cause of morbidity and mortality for mother and fetus
- There is a now an evidence base for treatment of diabetes in pregnancy, whether GDM, T1DM or T2DM
- There is less consensual evidence for the screening and diagnostic tests for GDM; a pragmatic approach is therefore suggested
- The prevalence for T2DM and risk factors for GDM, including ethnicity, should be taken into consideration when deciding which screening system for GDM is best suited for any individual antenatal unit

sion to T2DM.[17] Ideally, all mothers following a GDM pregnancy should have a six weeks' fasting plasma glucose to ensure they do not have T2DM; thereafter they should be screened annually for T2DM in primary care. At the time of this annual screening, lifestyle advice for the prevention of T2DM should be reinforced.

Conclusion

Gestational diabetes mellitus is a cause of morbidity for the mother and her child and is associated with an increased perinatal mortality rate. The optimum screening policy for an antenatal clinic should vary according to the background prevalence of GDM and T2DM. The precise level of glycaemia that predicts adverse outcome is not known. On present evidence, a two-hour glucose level in a 75g OGTT >7.8mmol/L benefits from active treatment. We believe diabetes should be actively sought and treated in pregnancy and that the original 2003 NICE antenatal recommendations not to routinely screen are now out dated. We offer a pragmatic approach for the detection of glucose intolerance in pregnancy as we await the NICE 2007 review of the original 2003 NICE antenatal recommendations.

Conflict of interest statement

There are no conflicts of interest.

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