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REVIEW

GESTATIONAL DIABETES. OBSTETRICAL PERSPECTIVE

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Abstract

This review discusses current international recommendations for GDM diagnosis and management and argues whether it would be worth considering first, universal screening for GDM in our country, second, updating of management guidelines and third, organized follow-up of women diagnosed with GDM and adoption of lifestyle interventions after delivery that could reduce the onset and prevalence of type 2 DM.

Key words: gestational diabetes, type 2 diabetes mellitus, pregnancy.

INTRODUCTION

Gestational diabetes mellitus (GDM) is the most frequent medical complication of pregnancy. The condition is defined as glucose intolerance resulting in hyperglycemia of variable severity with onset or first recognition during pregnancy (1).

In normal pregnancy there is an increase in insulin resistance in order to make glucose, free fatty acids and amino acids available for the fetus. The increase in insulin resistance, which emerges in the second trimester and progresses over the late third trimester, is caused by increasing maternal weight and circulating hormonal factors produced by the mother and placenta, including human placental lactogen, progesterone, growth hormone, cortisol and prolactin. Despite the increased insulin resistance during pregnancy, most women maintain normal blood glucose levels through enhanced insulin production and its release by the pancreas. However, in women who develop GDM, there is diminished pancreatic ß-cell reserve and production of insulin fails to keep up with the increased insulin demand resulting in hyperglycemia.

There is a consistent relationship between hyperglycemia and adverse pregnancy outcomes that has been well defined through a large volume of observational epidemiological studies (2-6). The risk of adverse pregnancy outcomes increases in a continuous fashion with increase in maternal glycemia, be it fasting glucose, post load glucose concentrations or glycosylated hemoglobin (2, 7).

Prevalence

There are large variations in the prevalence of GDM between different populations ranging from as low as 0.6% in Scandinavian states (8) to as high as 25% in south-eastern Asia (9). The large variations in prevalence are a consequence of demographic characteristics, including racial origin and maternal weight, criteria used for the diagnosis of GDM and importantly, the prevalence of type 2 diabetes mellitus (DM) in the given population because development of GDM reflects predisposition to type 2 DM. The prevalence of GDM in Romania is not known but the prevalence of type 2 DM is thought to be about 12% (10).

Risk factors

Risk factors for GDM are increased maternal age and weight, known impaired glucose tolerance, conception with use of ovulation drugs, family history of DM, African, south and east Asian racial origin and development of GDM or birth of a macrosomia baby in a previous pregnancy. The highest risk factor is previous GDM with a 50-fold increased risk of recurrence (11).

Diagnosis

Diagnosis of GDM relies on the measurement of maternal blood glucose levels before and after the administration of an oral glucose load, referred to as oral glucose tolerance test (OGTT). However, there is controversy concerning the selection of patients to be offered the OGTT, the glucose load and the glucose cut-offs for diagnosis of GDM.

Universal versus selective screening

Selective screening, based on risk factors, is

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in use in many European countries including Romania (12). This approach has lower costs but it has a poor performance, with detection of only about 45% of cases of GDM (13). It is particularly inefficient for nulliparous women. Universal screening, which is carried out in the USA and some European countries is desirable but it has higher costs. Recent studies have, however, confirmed that universal screening for GDM in all pregnant women is cost-effective in the long term because intervention strategies for these patients may prevent the long term risk of type 2 DM (14).

One-step versus two-steps approach with glucose load and cut-offs

The International Association of Diabetes in Pregnancy Study Group (IADPSG) has proposed a one-step screening approach, whereby a 75 grams (g) oral glucose tolerance test (OGTT) is carried out in all pregnant women at 24 - 28 weeks' gestation. This strategy has been adopted in 2013 by the World Health Organization (WHO) and is in use in most European countries (12, 15).

The American College of Obstetricians and Gynecologists (ACOG) and the National Institute of Health (NIH) in the USA recommend a two-step approach. All women are offered non-fasting 50 g glucose challenge test (OGCT) and those with glucose values of >140 mg/dL at one hour are subsequently offered a 100 g OGTT. The diagnostic criteria for GDM are summarized in Table 1.

Timing

Screening and diagnosis of GDM is traditionally delayed until the late second or early third trimester of pregnancy, because the diabetogenic effects of pregnancy increase with gestation and, therefore, delayed testing maximizes the detection rate. However, because of the increasing number of type 2 DM in women of childbearing age, it has become reasonable to screen women at their first prenatal visit for type 2 DM using standard criteria as those used outside pregnancy. Women with normal results during the first trimester are screened again (either all or only those with risk factors, depending of local protocols) at 24-28 weeks.

An ideal approach would be to undertake earlier testing for GDM and adjust the traditional criteria of the tests with the rationale that early identification of the high-risk group is likely to improve pregnancy outcome because with appropriate dietary advice and pharmacological interventions the incidence of the disease and associated maternal and perinatal complications could potentially be reduced (11).

Current recommendations in Romania

In Romania, because the incidence of type 2 DM is high, all pregnant women are screened for overt type 2 DM at their first prenatal visit using the plasma glucose threshold of 126 mg/dL for diagnosis. Women at risk and without overt diabetes have 75 g OGTT at 24-28 weeks. There is currently no national policy for postpartum screening and/or follow-up for women diagnosed with GDM in their pregnancy. Guidelines for management of a pregnancy affected by GDM have not been updated since 2012.

Since the reported prevalence of type 2 DM is high it would be worth considering first, universal screening for GDM, second, a review of the obstetrical guidelines for managing a pregnancy with GDM and third, follow-up of women diagnosed with GDM and adoption of life-style interventions that could reduce the onset and prevalence of type 2 DM.

Effects on the fetus and child

Fetal exposure to maternal hyperglycemia leads to fetal hyperglycemia providing excess nutrition that in turn accelerates fetal growth leading to macrosomia and neonatal disturbance in glucose metabolism (16).

Macrosomia

There is an association between GDM and fetal macrosomia, with consequent increased risk of caesarean section, shoulder dystocia, birth trauma, and admission to the neonatal intensive care unit. Treatment of GDM decreases the relative risk of macrosomia and associated complications (17).

Table 1. Diagnostic criteria for GDM

	One-step approach	Two-step approach	
	75 g OGTT	100 g OGTT after positive 50 g OGCT*	
Criteria		Carpenter/Coustan	NDDG
Fasting	92	95	105
1 h	180	180	180
2 h	153	155	165
3h	-	140	145
Diagnosis	1 or more values of ≥	2 or more values of ≥	

g – grams of glucose; NDDG – American National Diabetes Data Group.
* glucose level ≥ 140 mg/dL

Fetal death

There is conflicting evidence as to whether GDM independently increases the rate of stillbirth. When GDM was first recognized in the 1960s, an increase in stillbirth associated with undiagnosed or untreated GDM was noticed. However, recent large studies do not support this association. Testing for and treating GDM is the single most important factor to reduce associated perinatal risks.

Long-term consequences

Follow-up studies have shown that the risks of obesity, metabolic syndrome, type 2 DM and impaired insulin sensitivity and secretion are 2-8 fold higher in offspring of mothers with GDM as compared to non-diabetic mothers (18).

Effects on the mother

Short-term

Macrosomia is associated with increased risk of birth canal trauma. Caesarean section rate is higher in patients with GDM (19). Another consistently described complication in GDM patients is preeclampsia (2). The risk of macrosomia and associated maternal trauma, as well as the rate of caesarean section and incidence of pregnancy hypertension in GDM are reduced by appropriate treatment of GDM (17, 20).

Long-term

More than 50% of women that develop GDM will go on to develop type 2 DM in the subsequent 10 years (21, 22) and in this respect GDM can be considered to represent pre-type 2 DM. Postpartum follow-up of women with GDM and prophylactic treatment and lifestyle interventions reduce consistently the risk of developing type 2 DM (23, 24). The high association between GDM and type 2 DM, which is one of the most common conditions affecting adults, supports universal screening for GDM because appropriate interventions in these women after delivery could prevent development of Type 2 DM (24).

MANAGEMENT

Pregnancy management

Glycemic control

Patients with GDM should be managed by a multidisciplinary team of obstetricians, maternal-fetal medicine specialists and diabetes specialists with experience in treating pregnant women. The first-line of treatment is advice on diet modification with regulation of carbohydrate intake and moderate daily exercise. Women are advised to keep a diary of their home blood glucose readings and the recommended targets are fasting level ≤ 95 mg/dL and either 1-hour postprandial ≤ 140 mg/dL or 2-hour postprandial ≤ 120 mg/dL (25).

More than 80% of women diagnosed with GDM will achieve good glycemic control with diet and lifestyle interventions alone. If good glycemic control is not achieved, then treatment with insulin should be introduced and such therapy improves perinatal outcomes (20). Metformin, a drug frequently used outside pregnancy, is a safe and efficient alternative to insulin (26).

Monitoring for pregnancy complications

Pregnancies with GDM are at increased risk of fetal macrosomia and preeclampsia. They should be assessed every two weeks to monitor fetal growth and amniotic fluid by ultrasound examinations, as well as glycemic control, blood pressure and urinalysis for proteinuria. Accelerated fetal growth and polyhydramnios reflect poor glycemic control.

Time and mode of delivery

Time and mode of delivery essentially depend on maternal glycemic control, fetal growth and development of preeclampsia. In pregnancies with good glycemic control, fetal growth within the normal range and normal blood pressure, induction of labor aiming for vaginal birth should be undertaken at 39-40 weeks' gestation. For GDM requiring medication, but with otherwise good glycemic control, induction of labor is undertaken after 38 weeks' gestation (27).

In cases of poor glycemic control, evidence of accelerated fetal growth above the 90th percentile and polyhydramnios delivery from as early as 34 weeks should be considered. If the estimated fetal weight is >4500 g the risks of birth trauma to the mother and baby are substantially increased and delivery by cesarean section should be considered (28). In cases developing preeclampsia the time and mode of delivery will depend on the maternal and fetal condition.

In women with GDM requiring treatment with insulin, intrapartum care includes the use of insulin infusion with adjustment of doses depending on regular glucose readings. After delivery, insulin or oral hypoglycemic drugs should be discontinued.

Management after delivery

Women with GDM should be encouraged to breastfeed and lose the weight gained during pregnancy. The recurrence rate for GDM with a future pregnancy can be as high as 80% (29).

Women with GDM should be advised that both they and their offspring are at increased risk for

subsequent development of type 2 DM and that the risk is reduced by lifestyle modification, including healthier diet and physical activity. Regular screening for type 2 DM in the years following a GDM affected pregnancy should be offered to for exclusion or early detection of type 2 DM.

Conflict of interest

The authors declare that they have no conflict of interest concerning this article.

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