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Review

Therapeutic and Pharmacological Effects of Insulin- A Review

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Abstract:
Since the Introduction of Insulin analogs in 1996, insulin therapy options for patients with type 1 and type 2 diabetes have expanded. Insulin therapies are now able to more closely mimic physiologic insulin secretion and thus achieve better glycemic control in patients with diabetes. This chapter reviews the pharmacology of available Insulin, types of insulin regimens, and principles of dosage selection and adjustment, and provides an overview of insulin pump therapy.

Keywords:
Diabetes, Insulin's, rDNA Technology, Glycaemic, Therapeutic Property.

Introduction

Gestational diabetes mellitus (GDM) is typically defined as hyperglycemia that is diagnosed or develops during pregnancy. GDM is often divided into classes, primarily diet-controlled GDM (class A1GDM) or GDM requiring pharmacologic treatment of hyperglycemia (class A2GDM).[1] The benefits of identifying GDM have long been established, with several studies demonstrating that women diagnosed with GDM are at high risk for developing type 2 diabetes long-term and that antepartum GDM treatment reduces adverse pregnancy outcomes. However, a consensus on the diagnostic criteria for GDM or the optimal timing for pregnancy screening has not been reached.[2]

Over several decades, GDM management approaches have continued to evolve due to alarmingly high perinatal mortality rates among women with diabetes during pregnancy. A significant leap came in 1964 with the publication of O'Sullivan and Mahan's landmark study that defined specific diagnostic criteria for GDM in the United States. Their criteria, based on a 100-gram 3-hour oral glucose tolerance test, were designed to identify women at increased risk, aiming to correlate maternal hyperglycemia with adverse perinatal outcomes. Subsequent validation studies underscored the importance of these thresholds in predicting both immediate complications and long-term health risks for mothers and their childrenPlacental hormone release causes marked insulin resistance. Human placental lactogen is the primary hormone associated with increased insulin resistance; however, this hormone also increases insulin secretion and β-cell proliferation to regulate maternal hyperglycemia in normal pregnancies. Conversely, in patients with GDM, conditions or factors are present that cause maternal pancreatic β-cell dysfunction or the delayed response of the β cells, resulting in decreased insulin secretion and ultimately leading to maternal hyperglycemia. Another factor that promotes abnormally increased insulin resistance is maternal obesity early in pregnancy due to higher free fatty acid levels, which inhibits maternal glucose uptake and stimulates hepatic gluconeogenesis.

Gestational Diabetes Risk Factors the following clinical factors are associated with a high risk of developing gestational diabetes:

- Increased body weight (a BMI >25 or >23 in Asian Americans)
- Decreased physical activity
- A first-degree relative with diabetes mellitus
- High-risk ethnicity (eg, African American, Latino, Native American, Asian American, Pacific Islander)

Epidemiology

GDM is a common complication in pregnancy. The International Diabetes Federation recently estimated that globally, 1 in 6 live births had a GDM

diagnosis.[3] In the United States, approximately 7% of pregnancies were complicated by diabetes of any type, with 86% of those cases being pregnancies complicated by GDM.[1] The estimated prevalence of GDM in Europe is 10.9%.

Pathophysiology

Physiologic increases in circulating placental hormones, including growth hormone, corticotrophin-releasing hormone, human placental lactogen, prolactin, estrogen, and progesterone, increase insulin resistance during a normal pregnancy. Human placental lactogen is a hormone released by the placenta during pregnancy; this hormone has a comparable composition to growth hormone and induces significant metabolic changes during pregnancy to support the maintenance of fetal nutritional status. This hormone is capable of provoking alterations and modifications in the insulin receptors. Molecular variations, including molecular alteration of the beta-subunit insulin receptor, diminished tyrosine kinase phosphorylation, and remodelings in the insulin receptor substrate-1 and phosphatidylinositol 3-kinase, are associated with diminishing glucose uptake at peripheral tissues. Increased maternal insulin resistance causes elevated maternal postprandial glucose levels and free fatty acids, leading to more glucose available for fetal growth. However, normal pregnancies also have a corresponding increase in insulin secretion to maintain maternal euglycemia. These physiologic processes guide recommendations for GDM testing in the second and third trimesters.

Treatment / Management

Nonpharmacologic Therapies

GDM management begins with nonpharmacologic approaches, including increased physical activity, dietary changes, and glucose monitoring. The recommended amount of exercise for patients with GDM is 30 minutes of moderate-intensity aerobic exercise, at least 5 days a week, or a minimum of 150 minutes per week. Additionally, postprandial exercise is often recommended, as it has been shown to help control glucose levels for up to 3 hours after eating.[2]

Dietary modifications and gestational weight gain

The ADA and ACOG also recommend nutritional counseling by a registered dietitian and the development of a personalized plan based on the patient's BMI to ensure that the patient's caloric demand is met while avoiding excessive weight gain. Clinicians can also advise patients regarding general dietary modifications, including consuming 3 small to moderate-sized meals and 2 to 3 snacks daily, comprised of whole-grain carbohydrates, protein, and unsaturated fats, with less carbohydrate at breakfast due to increased carbohydrate intolerance during that time.

Differential Diagnosis

Many women do not receive the appropriate screening for diabetes mellitus before pregnancy, so in some cases, it is challenging to distinguish GDM from preexisting diabetes and maturity-onset diabetes of the young.

Prognosis

Proper control of maternal glucose levels significantly reduces GDM risks, including macrosomia and neonatal hypoglycemia. The risk of preeclampsia decreases from 18% to 12% with treatment.[1] If GDM interventions, including dietary modifications or pharmacologic therapy, are implemented early enough, progression to type 2 diabetes in 10 years is reduced by 35% to 40%. Furthermore, even small reductions in BMI can result in a reduced risk for diabetes by 25%.[20]

Complications of Maternal and fetal complications are associated with GDM. The fetal complications include macrosomia, neonatal hypoglycemia, polycythemia, shoulder dystocia, hyperbilirubinemia, neonatal respiratory distress syndrome, increased perinatal mortality.

Complications that may affect your baby

If you have gestational diabetes, your baby may be at higher risk of:

- **High birth weight.** If your blood sugar level is high, it may cause your baby to grow too large. Babies who weigh 9 pounds or more are more likely to become stuck in the birth canal, have birth injuries or need a C-section delivery.
- **Early birth.** High blood sugar may raise the risk of labor and delivery before your pregnancy due date. This is called preterm birth. Or you could need an early delivery because the baby is large.

- **Trouble breathing.** Babies born early may have a condition that makes breathing hard, called respiratory distress syndrome.
- **Low blood sugar.** Sometimes babies have low blood sugar, called hypoglycemia, shortly after birth. Severe hypoglycemia may cause seizures. Being fed right away and sometimes getting glucose through a vein can raise the baby's blood sugar level.
- **Obesity and type 2 diabetes later in life.** Babies have a higher risk of being obese and having type 2 diabetes later in life.
- **Stillbirth.** Gestational diabetes that is not treated could result in a baby's death either before or shortly after birth.

Complications that may affect you

Gestational diabetes may raise your risk of:

- **High blood pressure and preeclampsia.** Gestational diabetes raises the risk of high blood pressure. It also raises the risk of a serious complication of pregnancy that causes high blood pressure and other symptoms, called preeclampsia. These conditions can threaten your life and your baby's life.
- **Having a surgical delivery.** You're more likely to have a C-section if you have gestational diabetes.
- **Future diabetes.** If you have gestational diabetes, you're more likely to get it again during a future pregnancy. You also have a higher risk of getting type 2 diabetes as you get older.

Prevention

There is no sure way to prevent gestational diabetes. But having healthy habits before pregnancy can help. If you've had gestational diabetes, these healthy choices also might lower your risk of getting diabetes again. That includes developing gestational diabetes during another pregnancy and developing type 2 diabetes in the future.

Eat healthy foods. Choose a variety of foods high in fiber and low in fat and calories. Focus on fruits, vegetables and whole grains. Eat healthy portion sizes.

Keep active. Exercising before and during pregnancy can help protect you from getting gestational diabetes. Aim for 30 minutes of moderate activity on most days of the week. Take a brisk daily walk. Ride a bike. Swim laps.

Short bursts of activity add up. These might include parking further away from the store when you run errands or taking short walks throughout the day.

Start pregnancy at a healthy weight. If you're planning to get pregnant, losing extra weight before you do may help you have a healthy pregnancy. Make lasting changes to your eating habits, such as eating more vegetables and fruits.

Don't gain more weight than recommended. Gaining some weight during pregnancy is healthy. But gaining too much weight too quickly can raise your risk of gestational diabetes. Ask your healthcare professional what a good amount of weight gain is for you.

Gestational Diabetes Screening and Diagnostic Testing

Several laboratory and aneuploid screening studies are performed during the second trimester to provide optimal time for potential interventions. ACOG and the United States Preventive Services Task Force (USPSTF), as well as other professional societies, recommend that laboratory studies for gestational diabetes be performed in all pregnant individuals between 24 and 28 weeks gestation. However, the screening method and cut-off thresholds vary among experts. The IADPSG and the American Diabetes Association (ADA) advocate for a 1-step screening approach for GDM using a 2-hour 75-g OGTT. The primary advantage of the 1-step approach is its ability to screen and diagnose GDM in a single visit, which streamlines the process for patients and clinicians. However, it necessitates fasting before the test and a commitment of approximately 2 hours for the entire procedure.

In contrast, the 2-step screening approach, recommended by the ACOG, starts with a nonfasting 1-hour 50-g glucose challenge test. This initial test can be conveniently integrated into routine prenatal visits and is more straightforward to implement. Most women who undergo the 1-hour glucose challenge test do not require further testing, as they do not meet the threshold for abnormal glucose levels. However, approximately 20% of women fail this initial screening and subsequently undergo a 3-hour fasting diagnostic OGTT to confirm GDM diagnosis. This additional step aims to reduce unnecessary testing and intervention for those who do not have GDM. Different cut-off

thresholds are used for the 50-g glucose tolerance screening to be considered an abnormal result, including ≥135 mg/dL (7.5 mmol/L), ≥130 mg/dL (7.22 mmol/L), and ≥140 mg/dL (7.8 mmol/L). Because studies have not demonstrated an optimal cut-off threshold, clinicians should determine which cut-off to implement based on the prevalence of community gestational diabetes risk factors and clinical preference for test sensitivity and specificity.

Postpartum Gestational Diabetes Evaluation

In the postpartum period, 24 to 72 hours after the delivery, glucose monitoring is recommended. After placenta removal, insulin resistance tends to improve; therefore, insulin or hypoglycemic agents can typically be tapered down. Furthermore, after delivery, GDM often resolves, but up to one-third of women affected may develop diabetes or impaired glucose metabolism later in life. Studies suggest that between 15% and 70% of women with a history of GDM may progress to diabetes, predominantly type 2 diabetes. Notably, women with a prior GDM diagnosis face a significantly higher risk—up to sevenfold—of developing type 2 diabetes compared to those without such a history. Given these risks, guidelines recommend postpartum screening for all women who have GDM, ideally between 4 to 12 weeks after delivery.

Two primary methods for postpartum screening include a fasting plasma glucose test and a 75-g, 2-hour OGTT. While the fasting plasma glucose test is simpler logistically, this method may miss detecting certain forms of abnormal glucose metabolism. Therefore, the OGTT is typically preferred as it can diagnose impaired fasting glucose levels and impaired glucose tolerance, providing a more comprehensive assessment of postpartum glucose status. The following management is recommended for various fasting plasma glucose and 2-hour OGTT results.

Treatment / Management

Nonpharmacologic Therapies

GDM management begins with nonpharmacologic approaches, including increased physical activity, dietary changes, and glucose monitoring. The recommended amount of exercise for patients with GDM is 30 minutes of moderate-intensity aerobic exercise, at least 5 days a week, or a minimum of 150 minutes per week. Additionally, postprandial exercise is often recommended, as it has been shown to help control glucose levels for up to 3 hours after eating.

Dietary modifications and gestational weight gain

The ADA and ACOG also recommend nutritional counseling by a registered dietitian and the development of a personalized plan based on the patient's BMI to ensure that the patient's caloric demand is met while avoiding excessive weight gain. Clinicians can also advise patients regarding general dietary modifications, including consuming 3 small to moderate-sized meals and 2 to 3 snacks daily, comprised of whole-grain carbohydrates, protein, and unsaturated fats, with less carbohydrate at breakfast due to increased carbohydrate intolerance during that time. ACOG recommends a diet lower in carbohydrates; however, the optimal ratio of specific macronutrients in patients with GDM has not been determined. Some studies have also found that combining carbohydrates with lean proteins can help reduce postprandial hypoglycemia. To prevent ketosis at night, which can have adverse effects on fetal neurodevelopment, a bedtime snack is often recommended.

Gestational weight gain may also affect pregnancies complicated by GDM. Maternal obesity and excessive weight gain have been associated with an increased risk of fetal macrosomia, gestational diabetes, gestational hypertension, preeclampsia, and Cesarean section. Obese women also have an increased risk of antepartum cardiac dysfunction, proteinuria, nonalcoholic fatty liver disease, and sleep apnea, as well as intrapartum complications, including endometritis, labor induction failure, venous thrombosis, and wound dehiscence. Macrosomia, which has a higher incidence in those who are obese, is also associated with maternal complications (eg, protracted or arrest of labor, uterine rupture, genital tract lacerations, and postpartum hemorrhage). Additionally, macrosomic neonates have an increased risk of shoulder dystocia, clavicular fractures, brachial plexus injuries, and nerve palsies. A recent meta-analysis showed that the highest risk of adverse outcomes occurred in women with a BMI of over 40 and a high total gestational weight gain. The same meta-analysis recommended the following range for gestational weight gain for each prepregnancy weight class:

- Underweight (BMI <18.5): 14 to <16 kg

- Normal weight (BMI 18.5 to 24.9): 10 to <18 kg
- Overweight (BMI 25 to 29.9): 2 to <16 kg
- Obesity grade 1 (BMI 30 to 34.9): 2 to <6 kg
- Obesity grade 2 (BMI 35 to 39.9): weight loss or gain of 0 to <4 kg
- Obesity grade 3 (BMI ≥40): 0 to <6 kg [15]

These gestational weight gain ranges for patients with obesity grades 1, 2, or 3 were lower than those recommended by the US National Academy of Medicine guidelines, which recommend 5 to 9 kg in this population. Individuals with obesity are more prevalent than underweight patients and continue to increase, with a reported prevalence in the US of approximately 34% Antepartum weight loss is not recommended due to the associated risk of small for gestational-age infants. Therefore, in obese pregnant women, the primary management involves diet and behavioral modifications and increased exercise.

Glucose monitoring

Glucose monitoring 4 times a day is generally advised, although evidence supporting the best frequency is lacking. Obtaining a finger stick blood glucose level once fasting and then 1 or 2 hours postprandial at each meal is the most common monitoring schedule used. Some experts recommend glucose monitoring 4 times a day for 2 weeks, and based on these findings, insulin therapy may be initiated in patients with high glucose levels or, in those with normal range results, glucose monitoring can be performed less frequently. The ADA and ACOG suggest a glucose target of less than 95 mg/dL fasting and 140 mg/dL postprandial or less at 1 hour or 120 mg/dL at 2 hours. Clinicians should advise patients to keep glucose reading logs that can be reviewed at weekly prenatal visits or more frequently as needed.

Pharmacologic Therapies

If the patient's glycemic control is not adequate despite optimal adherence to diet and exercise, pharmacologic treatment is recommended. Insulin therapy has traditionally been considered the standard therapy for patients with GDM not controlled by nonpharmacologic treatment. Oral agents are also commonly used, though this is an off-label use.

Insulin therapy

Insulin does not cross the placental barrier and is recommended by the ADA for first-line treatment of GDM. Insulin regimens usually consist of basal and short-acting insulin formulations. Basal dosages target fasting hyperglycemia, while postprandial hyperglycemia is typically treated by adjusting short-acting insulin dosages. Insulin dosages must be individualized based on glucose monitoring; however, the approximate total insulin required when initiating insulin therapy can be calculated using a patient's weight and gestational age (see Table. Calculation of Initial Total Daily Insulin Requirement for Gestational Diabetes). Thereafter, insulin dosage can be adjusted as indicated by glucose logs.

Oral hypoglycemic agents

The most commonly used oral hypoglycemic agents include metformin and glyburide; however, studies on their effectiveness have yielded mixed results. Glyburide can be initiated at 2.5 mg daily and a maximum dose of 20 mg. However, recent studies have not shown similar benefits to insulin treatment. Historically, glyburide was thought not to cross the placental barrier; however, recent study results indicate that this is inaccurate. Additionally, glyburide is associated with an increased risk of neonatal intensive care admission, respiratory distress syndrome, hypoglycemia, and birth injury, as well as possible fetal insulin stimulation. Therefore, ACOG has recommended that glyburide should not be considered a first-line therapy.

The initial dosage of metformin is typically 500 mg per day for 1 week, followed by twice-daily administration thereafter, with a maximum dose of 2,500 to 3,000 mg. Metformin is known to cross the placenta and have adverse effects, including preterm birth, maternal abdominal pain, and diarrhea. Furthermore, when compared to insulin, outcomes with metformin use, such as macrosomia, neonatal hypoglycemia, or cesarean delivery, were similar. Significant treatment failure was also noted, with 50% of patients requiring insulin therapy. Metformin may be considered as an alternative to insulin in patients who decline or are unable to afford insulin.

Obstetric Considerations

Due to obstetrical risks associated with GDM, management varies depending on multiple clinical factors. For instance, fetal growth is typically

assessed with serial ultrasound due to the risk of macrosomia and shoulder dystocia. GDM is also an indication of antepartum fetal surveillance due to the increased risk of fetal demise in patients with diabetes. Additionally, delivery timing and mode may vary depending on clinical indicators. ACOG guidelines recommend delivery by 40 6/7 weeks gestation in patients with diet-controlled GDM and 39 0/7 to 39 6/7 weeks gestation in those with medication-controlled GDM. However, in patients with uncontrolled GDM, delivery between 37 0/7 weeks and 38 6/7 weeks gestation is reasonable; for those with uncontrolled diabetes and other abnormal clinical factors (eg, abnormal antenatal fetal surveillance), earlier delivery may be considered. Furthermore, cesarean delivery may be discussed with women with GDM and an estimated fetal weight of 4500 g or greater.

Differential Diagnosis

Many women do not receive the appropriate screening for diabetes mellitus before pregnancy, so in some cases, it is challenging to distinguish GDM from preexisting diabetes and maturity-onset diabetes of the young.

Prognosis

Proper control of maternal glucose levels significantly reduces GDM risks, including macrosomia and neonatal hypoglycemia. The risk of preeclampsia decreases from 18% to 12% with treatment. If GDM interventions, including dietary modifications or pharmacologic therapy, are implemented early enough, progression to type 2 diabetes in 10 years is reduced by 35% to 40%. Furthermore, even small reductions in BMI can result in a reduced risk for diabetes by 25%.

Complications

Maternal and fetal complications are associated with GDM. The fetal complications include macrosomia, neonatal hypoglycemia, polycythemia, shoulder dystocia, hyperbilirubinemia, neonatal respiratory distress syndrome, increased perinatal mortality, and hypocalcemia. Maternal complications include preeclampsia, increased risk of developing diabetes mellitus, and increased risk of Cesarean delivery.

Consultations

Consultations that may be indicated for GDM management include:

- Obstetric specialist
- Maternal-fetal medicine specialists
- Endocrinologists
- Nutritional therapists [20]
- Deterrence and Patient Education

Patient education regarding appropriate diet changes, exercise, and lifestyle modifications can help to improve outcomes in patients with GDM.[22][23]Furthermore, regular follow-up care is crucial for women with a history of GDM, including repeat screening every 1 to 3 years if initial postpartum results are normal. This approach not only monitors for diabetes development but also supports early intervention to mitigate long-term health risks such as cardiovascular disease. Continued lifestyle interventions and dietary changes, similar to those proven effective in the Diabetes Prevention Program, play a pivotal role in managing and potentially preventing type 2 diabetes in this high-risk population.

Enhancing Healthcare Team Outcomes

The management of gestational diabetes demands a collaborative interprofessional team approach to ensure patient-centered care and optimize outcomes. Physicians, advanced practitioners, nurses, pharmacists, and other health professionals each play distinct yet interconnected roles in this endeavor. Physicians lead the clinical decision-making process, diagnosing gestational diabetes, formulating treatment plans, and monitoring maternal and fetal health throughout pregnancy. Advanced practitioners often manage day-to-day patient care, conducting regular assessments, adjusting treatment protocols as needed, and providing patient education on glucose monitoring, dietary modifications, and insulin administration.

Nurses are integral to the frontline delivery of care; they are responsible for monitoring patient adherence to treatment regimens and promptly identifying and reporting any adverse events or complications. Pharmacists contribute through medication management, ensuring accurate dosing of insulin or other antihyperglycemic agents, reconciling medications to prevent interactions, and counseling patients on proper administration and adherence to prescribed therapies.

Effective interprofessional communication is critical to coordinating care seamlessly across disciplines. Innovative models, such as pharmacy or nurse practitioner-led diabetic clinics, exemplify this collaborative effort by providing specialized

diabetes education, continuous monitoring of blood glucose levels, and facilitating timely referrals to specialists when necessary. These clinics not only alleviate the workload of obstetricians but also ensure that pregnant women with gestational diabetes receive comprehensive, coordinated care that addresses both their immediate needs and long-term health risks. This collaborative approach not only enhances patient safety by minimizing medication errors and optimizing therapy but also improves overall team performance and patient outcomes.

Screening for gestational diabetes

During your first antenatal appointment (also called a booking appointment) at around week 8 to 12 of your pregnancy, your midwife or doctor will ask you some questions to determine whether you're at an increased risk of gestational diabetes.If you have 1 or more risk factors for gestational diabetes you should be offered a screening test.The screening test is called an oral glucose tolerance test (OGTT), which takes about 2 hours.It involves having a blood test in the morning, when you have not had any food or drink for 8 to 10 hours (though you can usually drink water, but check with the hospital if you're unsure). You're then given a glucose drink. After resting for 2 hours, another blood sample is taken to see how your body is dealing with the glucose.

The OGTT is done when you're between 24 and 28 weeks pregnant. If you've had gestational diabetes before, you'll be offered an OGTT earlier in your pregnancy, soon after your booking appointment, then another OGTT at 24 to 28 weeks if the first test is normal.

Treatments for gestational diabetes

If you have gestational diabetes, the chances of having problems with your pregnancy can be reduced by controlling your blood sugar levels.You'll be given a blood sugar testing kit so you can monitor the effects of treatment.Blood sugar levels may be reduced by changing your diet and being more active if you can. Gentle activities such as walking, swimming and prenatal yoga can help reduce blood sugar. But tell your midwife or doctor before starting an activity you haven't done before.However, if these changes don't lower your blood sugar levels enough, you will need to take medicine as well. This may be tablets or insulin injections.You'll also be more closely monitored during your pregnancy and birth to check for any potential problems.If you have gestational diabetes, it's best to give birth before 41 weeks. Induction of labour or a caesarean section may be recommended if labour does not start naturally by this time.Earlier delivery may be recommended if there are concerns about your or your baby's health or if your blood sugar levels have not been well controlled.

Planning future pregnancies

If you've had gestational diabetes before and you're planning to get pregnant, make sure you get checked for diabetes. Your GP can arrange this.

If you do have diabetes, you should be referred to a diabetes pre-conception clinic for support to ensure your condition is well controlled before you get pregnant.If you have an unplanned pregnancy, talk to your GP and tell them you had gestational diabetes in your previous pregnancy.If tests show you do not have diabetes, you'll be offered screening earlier in pregnancy (soon after your first midwife appointment) and another test at 24 to 28 weeks if the first test is normal.Alternatively, your midwife or doctor may suggest you test your blood sugar levels yourself using a finger-pricking device in the same way as you did during your previous gestational diabetes.

Postdiagnostic testing

Once the diagnosis of diabetes is established in a pregnant woman, continued testing for glycemic control and diabetic complications is indicated for the remainder of the pregnancy.

- First-trimester laboratory studies
- HbA1C
- Blood urea nitrogen (BUN)
- Serum creatinine
- Thyroid-stimulating hormone
- Free thyroxine levels
- Spot urine protein-to-creatinine ratio
- Capillary blood sugar levels
- Second-trimester laboratory studies
- Spot urine protein-to-creatinine study in women with elevated value in first trimester
- Repeat HbA1C
- Capillary blood sugar levels

Ultrasonography

First trimester - Ultrasonographic assessment for pregnancy dating and viability

Second trimester - Detailed anatomic ultrasonogram at 18-20 weeks and a fetal echocardiogram if the maternal glycohemoglobin value was elevated in the first trimester

Third trimester - Growth ultrasonogram to assess fetal size every 4-6 weeks from 26-36 weeks in women with overt preexisting diabetes; perform a growth ultrasonogram for fetal size at least once at 36-37 weeks for women with gestational diabetes mellitus

Electrocardiography

If maternal diabetes is longstanding or associated with known microvascular disease, obtain a baseline maternal electrocardiogram (ECG) and echocardiogram.

Management Diet

The goal of dietary therapy is to avoid single large meals and foods with a large percentage of simple carbohydrates. The diet should include foods with complex carbohydrates and cellulose, such as whole grain breads and legumes.

Insulin

The goal of insulin therapy during pregnancy is to achieve glucose profiles similar to those of nondiabetic pregnant women. In gestational diabetes, early intervention with insulin or an oral agent is key to achieving a good outcome when diet therapy fails to provide adequate glycemic control.

Glyburide and metformin

The efficacy and safety of insulin have made it the standard for treatment of diabetes during pregnancy. Diabetic therapy with the oral agents glyburide and metformin, however, has been gaining in popularity. Trials have shown these 2 drugs to be effective, and no evidence of harm to the fetus has been found, although the potential for long-term adverse effects remains a concern. [6]

Prenatal obstetric management

Various fetal biophysical tests can ensure that the fetus is well oxygenated, including fetal heart rate testing, fetal movement assessment, ultrasonographic biophysical scoring, and fetal umbilical Doppler ultrasonographic studies.

Management of the neonate

Current recommendations for infants of diabetic mothers—the most critical metabolic problem for whom is hypoglycemia—include the employment of frequent blood glucose checks and early oral feeding (ideally from the breast) when possible, with infusion of intravenous glucose if oral measures prove insufficient.

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