Diabetes during pregnancy

Introduction

- Diabetes is a endocrinological disorder.
- The prevalence of diabetes is about 3% in the whole population.
- The characteristics of diabetes is elevated plasma glucose levels.

Diabetes during pregnancy

- Diabetes is a common complication of pregnancy.
- The prevalence of diabetes is about 15% in the pregnant women.
- The more and more attention was paid to diabetes during pregnancy.

Pathophysiology -insulin

- The glucose metabolism is mainly controlled by insulin.
- The insulin is secreted by pancreatic ßcell.
- The insulin promote the glucose metabolism in tissues throughout the body.
- As the blood glucose is utilized, the blood glucose levels would be lowered.

Pathophysiology -Insulin sensitivity

- In two conditions, the blood glucose will be elevated.
- One is the insufficient insulin secretion by beta cells.
- The other is the decreased insulin activity.
- The insulin activity is called as the insulin sensitivity.

Pathophysiology –placenta(1)

- The placenta can secrete a variety of hormones.
- These hormones include estrogen, progesterone, cortisol, human placental lactogen, human chorionic gonadotropin, etc.
- The hormones produced by placenta antagonize the effects of insulin.
- It is estimated that the insulin sensitivity will be decreased by 40% in the 3rd trimester.

Pathophysiology-placenta(2)

- The decreased insulin sensitivity is the key for the mechanism of GDM.
- For GDM, there are no placental hormones after delivery of placenta, so the insulin sensitivity and the blood glucose levels would be restored to the normal.

Classification

- Pregestational or overt: be diagnosed before pregnancy.

- Gestational diabetes Mellitus(GDM) : be diagnosed during pregnancy.

- GDM is more common than the overt diabetes.

Gestational diabetes mellitus

- Definition: any degree carbohydrate intolerance with onset or first recognition during pregnancy.
- GDM is more common than the overt diabetes.
- The GDM account for more than 90% of the whole diabetes during pregnancy.
- GDM could contain some pregestaional diabetes.

The impacts between pregnancy and diabetes

- The pregnancy and diabetes can impact each other.
- On one hand, the pregnancy can aggravate the diabetes.
- On the other hand, diabetes can exert adverse effects on the pregnant effects.

The impact of pregnancy on diabetes

- The insulin sensitivity is lowered during pregnancy.
- We should adjust the dosage of insulin according to the placenta status.

The adverse effects of diabetes

- The overt diabetes has more adverse effects than the GDM.
- The adverse effects on the fetus
- The adverse effects on the pregnant women.

The perinatal morbidity and mortality

- Miscarriage, preterm birth and fetal death
- Congenital malformation
- Macrosomia
- hydramnios
- Hypoglycemia
- Respiratory distress syndrome
- cardiomyopath

Miscarriage, preterm birth and fetal death

- Hyperglycemia can results in the elevated the incidence of Miscarriage, preterm birth and fetal death.

- In general, Miscarriage, preterm birth and fetal death are more rare in GDM population than in overt population.

The congenital malformation

- The overt diabetes is related to the pregestational daibetes.
- The incidence of the congenital malformation is not elevated in GDM women.

Macrosomia

- Glucose can cross the placenta.
- The Maternal hyperglycemia can cause the fetal hyperglycemia.
- The hyperglycemia would stimulate the growth of fetus, then macrosomia will occur.

Fetal growth restriction

- The fetal growth restriction can be seen in the women with overt diabetes, which is related to the vascular disorders.

- If women with diabetes during pregnancy could not get sufficient energy, the fetal growth will be influenced.

Hydramnios

- Hydramniosis a condition that occurs when too much amniotic fluid builds up during pregnancy. It is also called amniotic fluid disorder, or polyhydramnios
- Although diabetic pregnancies are often complicated by hydramnios, the cause is unclear.
- This finding suggests that the hydramnios associated with diabetes is a result of increased amnionic fluid glucose concentration.

Hypoglycemia

- The fetus produces its own insulin to modulate its blood glucose.
- The hyperinsulinemia will occur in response to the hyperglycemia in the fetus.
- After delivery, the blood glucose provided by mother will be stopped, but the insulin production would not be reduced, so the hyperglycemia will results in the newborns.

Respiratory distress syndrome

- The newborn respiratory distress syndrome is related to the fetal lung immaturity.
- Hyperinsulinemia inhibits fetal lung maturity.
- So diabetes can result in the respiratory distress syndrome.

The adverse effects on the mother

- Elevated incidence of the preeclampsia.
- Dystocia
- Infection
- Ketoacidosis

Preeclampsia

- Preeclampsia is a pregnancy complication characterized by high blood pressure and signs of damage to another organ system, often the kidneys.
- Preeclampsia is related to glucose control .
- Hypertension that is induced or exacerbated by pregnancy is the major complication that most often forces preterm delivery in diabetic women.

Distocia

- **Obstructed labour**, also known as **labour dystocia**, is when, even though the uterus is contracting normally, the baby does not exit the pelvis during childbirth due to being physically blocked
- Distocia is associated with macrosomia.
- Should distocia can results into serious birth trauma.

Ketoacidosis

- Although it affects only approximately 1 percent of diabetic pregnancies, ketoacidosis remains one of the most serious complication .
- The incidence of fetal loss is about 20 percent with ketoacidosis .
- Pregnant women usually have ketoacidosis with lower blood glucose levels than when nonpregnant.

Screening

- Most patients with GDM have normal fasting glucose levels.
- The challenge of glucose tolerance must be done for most cases with GDM.
- Plasma glucose after 50 g glucose test (50 gm glucose challenge test –GCT) is the best to identify women at risk for GDM

Screening – at the first antenatal visit

- Routine fasting glucose measurement
- Assess GDM risk.

The fasting glucose level

- Normal:<5.1 mmol/l
- Suspected pregestational diabetes: >7.0mmol/l
- Suspected GDM: 5.1-7.0 mmol/l

Assess the GDM risk

- The maternal age: young or old
- Weight before pregnancy: normal or obese
- The history of abnormal glucose metabolism
- The history of poor obstetrical outcome
- The familial history of abnormal glucose metabolism

Screening –at the 24 weeks visit

- OGTT should be done.
- There are some controversies.
- whether the universal or selective OGTT should be done?
- Which blood glucose level should be the optimal cutoff for diagnosis?

Screening strategy

- In our country, every pregnant woman is advised to do OGTT at about 24 weeks of gestation.

- If the GDM symptoms are present after 24 weeks, the OGTT should be done again.

The diagnosis criteria

Glucose measure	Glucose level threshold
Fasting plasma glucose	5.1mmol/l
1h plasam glucose	10.0mmol/l
2h plasma glucose	8.5mmol/l

*One or more of these values from a 75-g OGTT must be equaled or exceeded for the diagnosis of GDM.

Antepartum Management

- There is a consensus that once diabetes is diagnosed, the treatment should be recommended for diabetes during pregnancy.
- The goals of treatment are to prevent macrosomia, avoid ketosis, and detect pregnancy complications (eg, hypertension, intrauterine growth restriction, and fetal distress).
- The management includes diet, exercise and insulin.

Diet therapy

- The goals of diet therapy in GDM are to avoid ketosis, achieve normal blood glucose levels, obtain proper nutrition, and gain weight appropriately.

- The amount and distribution of carbohydrate should be based on clinical outcome measures (eg, hunger, blood glucose levels, weight gain), but a minimum of 175 g of carbohydrate per day should be provided.

- Carbohydrate should be distributed throughout the day in 5 to 7 meals and snacks.
- Use of a low–glycemic index diet decreases the need for insulinto maintain euglycemia.

Exercise

- Experts recommend that women with GDM should exercise regularly to control blood glucose levels.
- but an improvement in clinical outcomes has not been demonstrated from compliance with this recommendation.

Insulin therapy

- Traditionally, insulin is used if dietary management does not maintain blood glucose at normal levels.
- Insulin may be initiated at 0.7 U/kg actual body weight/d given in divided dosages: two-thirds of the daily dosage before breakfast and the remainder of the dosage before dinner.
- Insulin therapy require close monitoring and adjustment based on blood glucose levels, meal choices, and activity levels.

Obstetrics management(1)

- The goal of intrapartum GDM management is to avoid operative delivery, shoulder dystocia, birth trauma, and neonatal hypoglycemia.
- For patients who have maintained excellent control of blood glucose levels with diet and exercise, delivery is recommended at 40 weeks.
- For patients with medication-requiring GDM, induction at 38 to 39 weeks' gestation is recommended

Obstetrics management(2)

- In general, women with gestational diabetes who do not require insulin seldom require early delivery or other interventions.

- Elective cesarean delivery to avoid brachial plexus injuries in macrosomic infants is an important issue.

Postpartum management(1)

- In most women with GDM, hyperglycemia rapidly resolves shortly after delivery.

- It is reasonable to measure a single random or fasting blood glucose level before discharge from the hospital.

Postpartum management(2)

- Postpartum glucose tolerance testing is important for women who had GDM.
- Women with GDM have a 7-fold increased risk of developing type 2 diabetes mellitus compared with those who had a normoglycemic pregnancy.
- At 6 to 12 weeks postpartum, only one-third of women with persistent glucose intolerance have an abnormal fasting blood glucose level.
- Therefore, to detect all women with glucose intolerance, a 75-g, fasting, 2-hour, oral glucose tolerance test is recommended.