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A CASE STUDY: ADVANCE GESTATIONAL GLUCOSE SCREENING AND IMPORTANCE IN GESTATIONAL DIABETES MELLITUS

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ABSTRACT

Gestational diabetes mellitus (GDM) is defined as carbohydrate intolerance inonset or first recognition during pregnancy resulting in hyperglycemia. Normal screening for GDM is done at 24-36 weeks of gestation. In this case report, patient developed gestational diabetes at six weeks in two successive pregnancies. The patient undergone abortion at 8 weeks in the first pregnancy and is at high risk to develop GDM. In the second pregnancy, administration of insulin therapy at diagnoses was resulted in a successful outcome. Thus the need of screening of gestational diabetes as early in the first antenatal visit is efficient for detecting the forthcoming presence or absence of gestational mellitus.

KEYWORDS: Gestational diabetes mellitus, insulin, screening, antenatal visit.

INTRODUCTION

Gestational Diabetes Mellitus (GDM) is an important public health problem due to its high prevalence and its association with adverse maternal and fetal outcomes. Recent evidence has confirmed that the risk of adverse outcomes is more with increasing maternal blood glucose levels.[1] GDM is one of the subtypes of diabetes, the prevalence of which is constantly increasing. GDM is defined as glucose intolerance which is first detected during pregnancy.[2]

GDM is associated with an increased risk of hypertensive disorders like pre-eclampsia for mothers, preterm delivery, cesarean section and a higher risk for macrosomia, hypoglycemia, jaundice, respiratory distress syndrome, polycythemia, and hypocalcemia in infants. After delivery, the glucose levels return to normalcy, the mother is at a higher risk for Type 2 DM, and the child of a woman with GDM is at a higher risk for metabolic syndrome.[3] Normal

pregnancy is characterized by mild fasting hypoglycaemia, a moderate rise in postprandial plasma glucose, and hyperinsulinemia.[4] The postprandial hyperglycaemia is due to pregnancy induced physiological insulin resistance which may be due to involvement of hormones-like, prolactin, progesterone, cortisol and human placental lactogen.[5]

This case study support the concept of early screening and treatment of GDM in the high-risk group which includes women with history of previous GDM.

CASE STUDY

A 33 year old Asian woman, a housewife, presented to our hospital at six weeks of gestation in her first pregnancy in October 2017.Her body mass index was 23 and blood pressure was 124/80 mm Hg. There was no relevant past medical history. She had a strong family history of type 2 diabetes as both her parents were diabetic and one sister had gestational diabetes and later developed type 2 diabetes. Routine investigation for pregnancy like Haemoglobin, VDRL, Blood urea, HBsAg, urine complete examination and a basic Ultrasound was done. The patient screened were given to drink 75gm Glucose dissolved in 200ml of water (OGTT). Then venous blood samples were taken after 2 hrs and their plasma glucose levels were estimated by Glucose Oxidase Peroxidase (GOD-POD) method. The 2hr plasma glucose levels was 138mg/dl and the fasting blood glucose level was 106 mg/dl. Based on the World Health Organisation 1999 criteria, GDM was diagnosed, and advised for diet management therapy.[6] The pregnancy terminated spontaneously in abortion at 8 weeks. Eight weeks after the abortion, a 75 g OGTT was repeated and the blood glucose level was found to be normal. She was advised to follow a normal diet and to undergo GDM screening as soon as the next pregnancy is detected.

She conceived again in July 2018 and underwent a 75 g OGTT at six weeks gestation. The fasting value was 110 mg/dl and 2-h value was found to be 230 mg/dl. The result of the glycated haemoglobin (HbA_{1c}) testing done at the same time was 6.6% (reference range 6.6–8.3%). The patient was diagnosed with GDM and started with insulin therapy twice daily injections of human biphasic isophane insulin 30/70. Regular follow ups were done at intervals of 2–4 weeks depending on the glycaemic control achieved. Her average fasting and two hour plasma glucose values were 80 mg/dl and 110 mg/dl, respectively with HbA_{1c} being less than 6.5%.The insulin doses were increased with advancing pregnancy. At the end of the pregnancy, the total daily insulin dose was 30 units. The weight gain during pregnancy was 14 kg. At 37 weeks, the pregnancy was complicated by premature rupture of the membranes,

foetal bradycardia as a result an emergency elective caesarean section was done. A live and healthy female baby was delivered weighing 2830 g. The baby was delivered without any neonatal complications. In the next morning, the patient's glucose level returned to normal and insulin injections were also stopped. She was advised to undergo a 75 g OGTT at six weeks postpartum. She was informed of high risk of developing type 2 diabetes in later life, and was advised to maintain normal body weight by appropriate dietary modifications and regular physical exercises. She was also informed to undergo a 75 g OGTT every three years.

DISCUSSION

Normal pregnancy is pervaded by mild fasting hyperglycaemia, a moderate rise in postprandial plasma glucose and hyperinsulinaemia.[7] Although exact mechanism of GDM is unknown due to involvement of hormones like cortisol, prolactin, progesterone, and human placental lactogen, the postprandial hyperglycaemia is due to pregnancy induced physiological resistance to insulin.[8]

The most likely cause is the presence of human placental lactogen, because of its 1000-fold rise in level during pregnancy and its homology to the known insulin antagonist, the growth hormone. As the level of this hormone rises with advancing pregnancy, the insulin resistance worsens with time. It is at its maximum in the third trimester, necessitating a threefold rise in maternal insulin output to maintain euglycaemia.[9] Mothers with deficient β cell detain become glucose intolerant at this time. So, gestational diabetes mellitus typically appears late in the second trimester or early in the third trimester. Based on this fact, the current recommendation for screening for gestational diabetes mellitus is between 24 and 28 weeks of gestation.[6]

In this case, patient became glucose intolerant at six weeks in two successive pregnancies and was normoglycaemic after pregnancies. It can be concluded that the underlying cause of her glucose intolerance was early onset gestational diabetes rather than pregestational diabetes. Decreased peripheral insulin sensitivity is the most probable cause of her early onset gestational diabetes as evident by a landmark prospective study done by Catalano *et al.*[10] According to ADA guidelines 2019, Insulin is the preferred medication for pre-existing type 1 and type 2 diabetes which are not adequately controlled with diet, exercise, and metformin.[11] For gestational diabetes, insulin is the gold standard for the treatment. Human insulin, both regular and NPH, and the rapid acting insulin analogues such as lispro and

aspart have been licensed for usage in pregnancy. Insulin detemir has been approved for use in pregnancy while glargine is not approved in managing GDM.[12]

Poorly controlled glucose level both before and during the first trimester of pregnancy can cause major birth defects, spontaneous abortions and stillbirths.[13] A study conducted by *Bartha* et al demonstrated that out of the 65 cases, 61.5% (40) were diagnosed between 6 and 13 weeks of gestation. Women with early onset gestational diabetes was at a higher risk to develop hypertension and pre-eclampsia compared with the subgroup of women with late onset gestational diabetes.[14] There was a higher incidence of neonatal hypoglycemia and perinatal death and these women were more likely to require insulin for glycaemic control. Also, women with early onset gestational diabetes had higher risk of developing postpartum diabetes and glucose intolerance.

CONCLUSION

Early screening of GDM in the first antenatal visit and insulin therapy play a definite role in improving the outcome of pregnancy. This case calls for reshape the present clinical practice when dealing with pregnant women at high risk to develop gestational diabetes. The screening of high risk group for gestational diabetes at the first antenatal visit and if they are found negative at the initial screening, the screening should be retested between 24 and 28 weeks of gestation. The case emphasizses the importance of early screening for GDM and timely optimum intervention for a significant positive effect on both maternal as well as foetal outcomes in pregnancy.

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