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Case Report

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GESTATIONAL DIABETES: WHEN COMPLICATIONS APPEAR AMIDST POOR PATIENT COMPLIANCE. A CASE REPORT AND LITERATURE REVIEW

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ABSTRACT

A 37 year old patient who had a diagnosis of gestational diabetes mellitus at 27 weeks. From diagnosis to delivery was characterized by management challenges ranging from turbulent glycemic control due to poor patient compliance, fetal macrosomia, polyhydramnios and to neonatal hypoglycemia. It was the second time she would be diagnosed with GDM and experienced a rapid progression to type II DM months after delivery.

KEYWORDS: Gestational Diabetes Mellitus, Macrosomia, Perinatal mortality, Hyperglycemia.

INTRODUCTION

Gestational diabetes mellitus (GDM) is a condition that is sometimes defined as when any form glucose intolerance is recognized or detected for the first time in pregnancy.[1] A more recent definition captured by the American Diabetes Association defines it as diabetes diagnosed during pregnancy that is not clearly overt diabetes.[2] It is a condition that complicates between 1–14% of pregnancies depending on the affected population.[3] Its prevalence tends to mirror that of type II DM in any given population. The Influence of urbanization/westernization being seen in low and medium income countries with the attendant switch from indigenous diets to diets laden with fat, sugar and processed carbohydrates has been identified as a factor contributing to its increasing prevalence in such countries of which Nigeria is one.[3] A study by Kuti MA et al in south western Nigeria (which is the most urbanized geopolitical zone of the country) recorded a prevalence of 13.9%.[4] Gestational DM is associated with increased adverse pregnancy outcomes.[4] Its complications affect both the mother and the fetus/neonate, these women are at increased risk of future DM and cardiovascular disease.[5] Even though there is no global consensus on its diagnostic criteria the International Association of the Diabetes and Pregnancy Study Groups (IADPSG) recommends the use of 75g oral glucose tolerance test between 24 to 28 weeks gestation as a basis for the diagnosis of GDM, this was adopted by the American Diabetes Association (ADA) in December 2010 but the American College of Obstetricians and Gynecologists (ACOG) adopts a different criteria with a two step screening approach. The Society of Obstetricians and Gynecologists of Canada in their 2002 Practice guidelines accepted both approaches to the diagnosis of GDM.[7] There is no consensus protocol for its diagnosis and management in Nigeria. Universal screening is currently the ideal but in resource constrained settings like Nigeria selective screening of high risk patients is still common place.[4]

A case of recurring GDM in a 37 year old with challenges in management as well as maternal and fetal complications is presented below.

CASE REPORT

A booked 37 year old Gravida 3 Para 2 at a gestational age of 27 weeks was diagnosed with gestational diabetes mellitus. Index pregnancy was planned, spontaneous and she had preconception care. She however registered for antenatal care at a gestational age of 18 weeks and had been regular with her scheduled visits. She had a similar diagnosis in the preceding pregnancy (2 years prior to the current pregnancy) at 34 weeks of gestation. She became euglycemic after the first spell of GDM.

Her two previous deliveries were by caesarean section with the birth of 2 live female neonates that are alive and healthy. Hence the planned mode of delivery for the index pregnancy was planned caesarean delivery at 39 weeks.

Her routine investigations at booking were all within normal limits and her initial FBS was 89 mg/dl. However

given her known history of GDM in a prior pregnancy, routine capillary glucose testing was done at each visit. The first abnormal value was detected at 27 weeks with an RBS of 168 mg/dl and ++ of glycosuria, serum electrolytes were not deranged, serum urea and creatinine levels were essentially normal. A 75 g oral glucose tolerance test (OGTT) was done and it confirmed the diagnosis with FBS of 144 mg/dl and a 2 hour value of 190 mg/dl. She was admitted and placed on a thrice daily regimen of short acting insulin (8 units after breakfast, 14 units after lunch and 8 after dinner which was adjusted over a period of 6 days to 14units: 22units: 16 units.) An endocrinologist and a dietician were involved in her glycemic control. She was counseled extensively on her condition but upon discharge failed to comply with directives on the use of insulin and glycemic monitoring. This was evident from the interval history on her follow up visit 10 days after her discharge from hospital. Her RBS was 198 mg/dl and she was readmitted, glycemic control was achieved with a combination of short and intermediate acting insulin given twice daily. She was the switched over to metformin 1000mg BD to ensure better compliance upon discharge. She was seen on a weekly basis and at 32 weeks her metformin dosage was increased to 2500mg in 3 divided doses. At 36 weeks she was admitted for the third time with hyperglycemia (FBS of 138 mg/dl), and ultrasound diagnoses of fetal macrosomia and moderate polyhydramnios (maximum vertical pocket of 12cm) were made. She was stabilized on a combination of metformin and intermediate acting insulin.

She had caesarean delivery at 39 weeks and 2 days with a live male neonate weighing 4.6kg. The neonate had Apgar scores of 6 in 1 minute and 10 in 5 minutes, he was transferred to the neonatal intensive care unit (NICU) for monitoring and the neonatologist noted hypoglycemia on admission to NICU. The mother became euglycemic by the 6th day postpartum. Mother and neonate were both discharged on the 8th day post op.

She was seen 4 months later with hyperglycemia (RBS of 226 mg/dl) and cellulitis, FBS the following day was 160 mg/dl, she was placed on metformin and antibiotics. She was educated on the need for lifestyle changes, anti-diabetic drug therapy and the need for contraception and preconception care for future desired pregnancies. She was thus diagnosed with type II DM and her management was supervised by the endocrinologist.

DISCUSSION

Pregnancy is a diabetogenic state characterized by increased insulin resistance and hyperinsulinemia. Cortisol, growth hormone, human placental lactogen, estrogen and progesterone all play a role in altering the glucose insulin balance seen in pregnancy.[9] Gestational diabetes mellitus is a common medical complication of pregnancy which increases the risk of maternal and perinatal morbidity and mortality.[1,8,9] There are multiple adverse pregnancy outcomes that are an offshoot of this condition these include large for gestational age birth weight/macrosomia, hypoglycemia, neonatal intensive care unit admissions (all of which were seen in the newborn of the case discussed above), stillbirth, shoulder dystocia, hyperbilirubinemia, hypothermia, respiratory distress syndrome as well as an increased risk of the child developing diabetes later in life, and as many as 40 – 60% of women with GDM will go on to develop type II DM later on in life.[1,9] In the case of the patient managed this appeared shortly after a second spell of GDM in her third pregnancy. There are conflicts in diagnostic and management guidelines for this condition.[1]

There are various risk factors for GDM which include advancing maternal age, parity, body mass index, family history of DM in a first degree relative, previous GDM, previous macrosomia (birth weight > 4kg) and ethnic groups like African Americans, Hispanics, South and East Asians.[1,6] The patient had multiple risk factors necessitating the need for preconception care before the index pregnancy and vigilant monitoring of her serum glucose levels at each visit during the pregnancy.

Diagnosis of GDM depends on which guideline the clinician is using as there is currently no consensus in the diagnostic screening approach nor criteria for diagnosis. Whether a one step or a two step sequential approach to screening should be used is still subject to debate. The one step diagnostic method uses 75g oral glucose tolerance testing whereas the two step approach uses an initial 50g oral glucose challenge test, then for those with 1 hour serum glucose values that are elevated to or above the cut off values of 135 – 140 mg/dl it is then followed by the use of 100g oral glucose tolerance test with three post intake serum glucose measurements spread 1 hour apart whereas this is done only twice with the 75g test, both testing methods factor in fasting serum glucose levels as a baseline measurement.[8,10] The different diagnostic criteria include the World Health Organization (WHO) 2013 guidelines with one or more of the outlined criteria being met for a diagnosis of GDM; fasting plasma glucose of 5.1 – 6.9 mmol/l (92 – 125 mg/dl), 1 hour plasma glucose $\geq$ 10.0 mmol/l (180 mg/dl) after a 75g oral glucose load, and 2 hour plasma glucose of 8.5 – 11.0 mmol/l (153 – 199 mg/dl) after a 75g oral glucose load. The National Diabetes Data Group (NDDG) criteria uses the following abnormal values: fasting serum glucose concentration exceeding 105 mg/dl (5.8 mmol/l), 1 hour serum glucose concentration exceeding 190 mg/dl (10.0 mmol/l), 2 hour serum glucose levels above 165 mg/dl (9.2 mmol/l) and 3 hour serum glucose levels in excess of 145 mg/dl (8.1 mmol/l). The Carpenter and Coustan conversion method uses the following values as its cut off 95 mg/dl (5.3 mmol/l) for fasting serum glucose, 180m mg/dl (10.0 mmol/l) for 1 hour serum glucose concentration, 155 mg/dl (8.6 mmol/l) for 2 hour serum glucose concentration and 140 mg/dl (8.3 mmol/l) for 3 hour serum glucose levels, according to the NDDG and

Carpenter and Coustan criteria 2 or 3 abnormal values above the stated cut offs are required for a diagnosis of GDM.[8-11] It is worthy to note that various other diagnostic criteria are contained in the literature.[12] The WHO criteria was used in the index case to make the diagnosis of GDM.

From the varying diagnostic criteria it is evident that there is still a lack of uniformity hence GDM may be either over or under diagnosed depending on the criteria being used. It is however interesting to note that hyperglycemic levels that don't qualify a woman to be categorized as having overt diabetes still have a correlation with perinatal morbidity. This was seen in the results of both the Australian Carbohydrate Intolerance Study in Pregnant Women (ACHOIS) and The Hyperglycemic and Adverse Pregnancy Outcomes (HAPO) study, an association that points to a need for a reconsideration of the current diagnostic criteria and by extension the treatment of hyperglycemia in pregnancy.[13,14]

Once a diagnosis is made it is recommended that medical nutrition therapy be initiated with relevant caloric adjustments being made, physical exercise is also advocated by some experts as it has been shown to improve glycemic control.[1] The hallmark of management is tight glycemic control with capillary blood glucose measurements on waking up (FBS), then one or two hours after breakfast, lunch and dinner. The use of insulin once dietary measures fail to achieve glycemic control. Insulin analogs like lispro and aspart have been shown to be very effective in achieving glycemic control.[1] The choice of insulin is tailored to the patients needs and the aim to achieve tight control of serum glucose concentrations. Short, intermediate and long acting insulin have been documented to be used in various literature with satisfactory results. In our patient we started with short acting insulin before switching to a combination of short and intermediate acting insulin. The use of oral hypoglycemic agents like metformin and glyburide have been documented.[1] A study done by Rowan et al compared the use of metformin and insulin with comparable results however there was an increase in preterm births for those on metformin.[9] The study showed 46.3% of those on metformin required additional insulin in order to achieve satisfactory glycemic control, our patient fits into this category as she was ultimately controlled with a combination of metformin and supplemental insulin. Similarly in assessing the efficacy of metformin in comparison to insulin Juan Gui et al conducted a meta-analysis of 5 RCTs involving 1270 participants showing that metformin was a suitable treatment option for women with mild GDM.[15]

The serum glucose levels that are targeted in the management of GDM are; preprandial glucose < 95 mg/dl (5.3 mmol/l), 1 hour postprandial glucose < 140 mg/dl (7.8 mmol/l) and 2 hour postprandial glucose < 120 mg/dl (6.7mmol/l), the recommendations of ACOG mirror these values however both 130 mg/dl and 140 mg/dl are excepted 1 hour postprandial levels.[1,8]

Controversy exists as to the timing and method of delivery. For those on insulin therapy during delivery hourly serum glucose monitoring is the benchmark. Regular screening should be done for these women after childbirth starting postpartum, then at 6 weeks and then on a yearly basis.[1]

CONCLUSION

A proactive approach should be adopted by the clinician for women during pregnancy more so if they are at high risk for GDM as early detection and good glycemic control improve pregnancy outcomes.

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