Management of labour in pregnancy complicated by diabetes

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Abstract

Diabetes mellitus complicates <5% of all pregnancies in Pakistan, but is a major cause of perinatal morbidity and mortality, as well as maternal morbidity. Appropriate glycaemic control is not only important throughout pregnancy but is equally important during the intra-partum period. Increased blood glucose levels 4-6 hours prior to delivery increase the chances of hypoglycaemia in neonates. It is essential to optimize blood glucose levels during the intra-partum period as avoiding maternal hyperglycaemia will prevent foetal hyperglycaemia, and hence reduce the chances of neonatal hypoglycaemia and foetal acidaemia. Infants who develop neonatal hypoglycaemia, have a 2-3.5 times higher risk of developing neuro-developmental impairment on follow-up at 18 months to 7 years of age.

Keywords: Diabetes, Pregnancy, Labour Management, Gestational Diabetes Mellitus (GDM), Caesarean section, Neonatal hypoglycaemia, neonatal hyperinsulinaemia.

Introduction

Pregnancy complicated by diabetes carries risks to both the mother and foetus, before, during and after delivery. Good glycaemic control before, during and after pregnancy and appropriate timing and mode of delivery is crucial to a healthy outcome for both. Timing of delivery should be discussed with the pregnant woman with Gestational, Type 1 or Type 2 diabetes especially in the last trimester, preferably in the antenatal clinic. It has to be weighed against the risk of prematurity, intrauterine death and excessive foetal growth, if pregnancy is allowed to continue.

The neonate is at increased risk for hypoglycaemia, polycythemia, hyperbilirubinaemia, hypomagnesemia and hypocalcaemia.

Women who develop Gestational Diabetes Mellitus (GDM) have an increased risk for developing type 2 diabetes in later life.

Management prior to labour and Delivery

For gestational diabetes with no other complicating factor, Induction of labour (IOL) should be offered at 40+6 weeks as the risk increases for traumatic vaginal delivery, morbidity and mortality for the baby. Deliver before 40+6 weeks if there are maternal or foetal complicating factors (5).

For Type 1 and Type 2 diabetes without metabolic and other complicating factors, labour should be induced between 37 to 38 weeks gestation.

In a woman who has well controlled blood glucose levels, in the absence of any complication, pregnancy may be allowed to continue till term.

If there are complicating factors or metabolic complications then delivery should be advised even before 37 weeks.[1,2]

Considering the resource poor hospitals in Pakistan, it is usually not a good idea to continue pregnancy beyond 40 weeks as the risk of unexplained intrauterine death is present even in women with well controlled diabetes. The decision to continue pregnancy should be customized to patient-centered shared decision making by the treating physician.[3]

Factors favouring delivery before 37 weeks: History of previous pregnancy loss, previous intrauterine death (IUD) at term, macrosomia or previous caesarian sections.

Current obstetric factors include decreased foetal movements, macrosomia, Intrauterine growth restriction (IUGR), placental insufficiency, uncontrolled diabetes, retinal complications, renal complications, compromised cardiovascular health, psychological factors, patient request for early delivery, social factors, availability of neonatology care, ability to provide (antenatal corticosteroid therapy (ACS), inability to come for frequent follow-ups and patient having to travel long distance for obstetric/medical care.

Favouring term delivery (around 39 weeks gestation): Absence of bad obstetric history, optimal feto-maternal health, well controlled uncomplicated diabetes, patient reluctance for early delivery, lack of specialist neonatology care, inability to provide ACS coverage, geographic proximity of health-care facility and ability to travel comfortably and safely for obstetric follow-up.[3]

Gestational diabetes mellitus is not an absolute indication for caesarean birth. Pregnant women who have good metabolic control and who have no obstetric history of perinatal death, macrosomia or associated complications such as hypertension and preeclampsia can wait for spontaneous onset of labour.[4]

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In diabetic women with previous caesarean section, vaginal delivery is not a contraindication[1] Women who have a macrosomic foetus on ultrasound should be counseled about risks and benefits of vaginal birth, induction of labour and caesarean section.

The HAPO study, found a direct correlation between Caesarean section rate and maternal glycaemia with an overall frequency of 23.7%.[5]

The American College of Obstetrics and Gynaecology (ACOG) recommends caesarean delivery to pregnant diabetics who have an estimated foetal weight greater than 4500 g to prevent traumatic birth and complications like shoulder dystocia injuries and permanent brachial plexus damage. In women with good glycaemic control, delivery should not occur before 39 weeks unless the pregnancy is further complicated by other factors such as pre-eclampsia.[4,6]

Anaesthesia

As there is increased risk of Caesarean section, both elective and emergency, it is a good practice to get the pregnant woman with Diabetes and other co morbids evaluated for anaesthesia close to her delivery.

Blood glucose should be monitored half hourly during the Caesarean section by the anaesthetist.

If the Caesarean section is under general anaesthesia, blood glucose should be monitored every 30 minutes from induction of general anaesthesia until after the baby is born and the woman is fully conscious.[1]

Care during Labour

Hourly blood or capillary glucose monitoring should be done in labour and the levels should be maintained between 4-7 mmol/L (72 - 126 mg/dL).[1,2] If the blood glucose goes higher than this then intravenous Glucose and Insulin Infusion should be started to maintain capillary glucose in this range. This should be done for all women with Type 1 diabetes in labour.

During the latent phase of labour, the metabolic demands are stable, but during active labour there is increased metabolic demand and decreased insulin requirement. The ACOG recommends maintenance of blood glucose levels of 70 -110 mg/dl (3 .9-6.1 mmol/L).[6] Optimal levels vary in various studies, however, it is known that levels above 180 mg/dl (10 mmol/L) are associated with high risk of neonatal hypoglycaemia.[7] If blood glucose levels are not in this range, intravenous dextrose and insulin infusion should be used during labour and birth.

Continuous electronic foetal monitoring (CTG or cardiotocograph) is recommended if available. Labour should not be prolonged. Pain relief with epidural should be considered, as there is higher risk for foetal macrosomia, instrumental delivery, shoulder dystocia and C Section. For this reason senior obstetric staff should be available at the time of delivery. The paediatric team should also be available for neonatal resuscitation. Active Management of third stage of Labour (AMTSL) should be practiced as routine with IM Oxytocin 10 units or 600 mcg of Misoprostal oral/ sublingual/ per rectal administered within 10 minutes of birth.

Postpartum family planning is acceptable with all modern methods, including Post Placental / Intra-caesarean contraceptive device insertion (PPIUCD) immediately after delivery of the placenta or within 48 hours as well as after 6 weeks post partum. Healthy timing and spacing of pregnancy (HTSP) of 2 to 3 years should be encouraged.

Management during Cesarean Section and Induction

Very few women with Gestational Diabetes Mellitus (GDM) whether using insulin or not, require insulin in labour or during caesarean section. In women who are on treatment (insulin or oral hypoglycaemic agents) the recommendations for induction or caesarean section are as follows:

With onset of fasting (labour or caesarean section): In a diabetic mother if caesarean section is planned, the procedure should be planned early morning. The woman needs to take her usual night dose of intermediate-acting insulin and the morning dose of insulin has to be withheld and patient needs to be kept nil by mouth. If surgery is delayed it is needed to start basal and corrective regimen (DNS with short acting insulin) with one-third of the morning intermediate insulin dose with a 5% dextrose infusion to avoid ketosis. Blood glucose has to be monitored two hourly and if required subcutaneous dose of short acting insulin should be given as a corrective dose. Hyperglycaemia should be avoided during the surgery to reduce the risk of neonatal hypoglycaemia and wound infections in the mother. Urinary Ketones should also be monitored and corrective measures taken if present. For most women insulin is not required during labour or caesarean section. If blood glucose levels exceed 126 mg/dL (7.0 mmol/L) then IV Dextrose/insulin infusion regime should be started. Some favour the use of glucose infusion at the rate of 125 mg/hour with a simultaneous use of insulin infusion at the rate of 0.5-1 unit/hour. Blood glucose levels should be monitored four to six hourly while in labour. It is important to optimize blood glucose levels during surgery to prevent neonatal hypoglycaemia and lower the risk of wound infectons.[8]

Induction of labour

Induction of labour should be booked with the labour ward

Insulin Sliding scale (2-hourly)
Low dose For Type 1 diabetes and women with GDM on insulin, receiving < 40 units/day antenatally.

Blood glucose mmol/L	Units of Insulin
0-6 (0 - 108 mg/dL)	Nil
6.1 - 8 (110 - 144mg/dL)	2
8.1 - 10 (146 - 180mg/dL)	4
10.1 - 14 (182 - 252 mg/dL)	6
>14 (>252 mg/dL)	8 call Senior Physician

High dose For Type 2 diabetes and women with GDM on insulin, receiving ? to 40 Units/day antenatally.

Blood glucose mmol/L	Units of Insulin
0-6 (0 - 108 mg/dL)	Nil
6.1 - 8 (110 - 144mg/dL)	4
8.1 - 10 (146 - 180mg/dL)	6
10.1 - 14 (182 - 252 mg/dL)	8
>14 (>252 mg/dL)	10 call Senior Physician

in advance and noted in a Labour ward diary or register so that the duty staff is prepared. It should be planned early morning and the woman should be instructed to take her usual night dose of insulin, the night before Induction.

Morning fasting glucose level should be checked, a light breakfast given, and the usual short-acting insulin adjusted according to fasting glucose level and calories allowed for breakfast The insulin dose should be given while the prostaglandin is inserted. Oral food and fluids should be given according to the advice of the lead obstetrician/ clinician.

If labour is prolonged they have to be supplemented with 5% dextrose when blood glucose falls below 99 mg/dL (5.5mmol/L).

Intravenous insulin infusion via syringe pump is suitable for patients requiring intensive therapy and/or poor control on a sliding scale, for example in severe preeclampsia. In such cases also consult with Diabetes Physician.

- 50 units NovoRapid insulin in 50 mls of Normal saline.
- Aim to keep blood glucose level 72 -147 mg/d (4-7mmol/L)
- Start rate of 1-2 units/hour depending on initial blood glucose level
- If blood glucose level >126mg/dL (7 mmol/l), increase insulin by 1 unit/hour
- If blood glucose level >72mg/dL (4 mmol/L), decrease insulin by 1 unit/hour
- If blood glucose level is 72-126 mg/dL (4-7 mmol/L), maintain rate.

Note: do not use this regimen for diabetic ketoacidosis.

Consult an Endocrinologist for all patients with Diabetic Ketoacidosis.[9]

Newborn Care

Neonates of Diabetic mothers should stay with them unless there is an indication for NICU (Neonatal Intensive Care Unit) admission.

Preparations for neonatal resuscitation should be done in advance, and paediatric skilled staff should be available at the time of delivery. Baby's blood glucose should be checked within 2 to 4 hours of birth. Also test for polycythemia, hyperbilirubinaemia, hypomagnesemia and hypocalcaemia as well, if indicated.

An echocardiogram should be done if cardiac signs and symptoms are detected in the baby.

The baby should be admitted to NICU if showing respiratory distress, hypoglycaemia, polycythemia, Jaundice requiring phototherapy, gestation less than 34 weeks, showing signs of encephalopathy, cardiomyopathy/ murmur, requiring intravenous or tube feeding.

It is very important to keep the baby under observation for hypoglycaemia for the first 24 hours, ensuring that the baby's glucose level is above 36 mg/dL (2 mmol/L).

Early breastfeeding within 30 minutes of birth, should be encouraged . Feeding intervals should be 2 to 3 hours.

Postnatal Care

The insulin requirement drops dramatically after the placenta is delivered, therefore women should be advised to hold or reduce their insulin dose according to their postnatal blood glucose levels. Avoid IV Dextrose unless hypoglycaemic.

Post-operatively use low-dose sliding scale. Check capillary blood glucoses at 0700:, 1200:, 1700: and 2200 hours: until oral intake is established.

Once oral intake is started, check fasting glucose and before each meal.

For Type 1 and Type 2 Diabetes

- Check blood glucose within 2 hours of birth
- QID: fasting and before each meal on sliding scale insulin (low dose)
- Regular review by Diabetes Clinical Nurse Consultant and Physician until discharged
- Type 2 Diabetes women will usually not require insulin in

the postnatal period unless blood glucose levels are consistently elevated.

For GDM

- Blood glucose monitoring twice daily for 48 hours
- Insulin is ceased post birth
- If blood glucose levels > 126 mg/dL (7.0 mmol/L), continue to monitor glucose until discharge - fasting and 2 hours after meals
- If blood glucose levels are persistently elevated after 72 hours, consult Diabetes Consultant

Those women with Type 2 Diabetes on Metformin or Glibenclamide, may continue these during breast feeding

Women with Type 1 or Type 2 Diabetes should be referred back to their routine Diabetic Care Physicians.

Follow up Care

GDM is associated with increased maternal risk for type 2 diabetes. Those who developed GDM should have a follow up at 6 weeks with a 75 G oral glucose tolerance test. If this is not possible, then a fasting blood glucose, or HbA1c to exclude diabetes.

Test women with GDM every 1-3 years if her 6- to 12-wk OGTT is normal.

The frequency of screening is based on the presence of risk factors: Family history, pre-pregnancy BMI, or need for insulin or OAD medications during pregnancy.

Ongoing screening may be done with any glycaemic test (HbA1C, fasting plasma glucose, OGTT) using non-pregnancy cut off points.

Metformin and intensive lifestyle changes prevent or delay progression to type 2 diabetes.[10]

Conclusion

Gestational, Type 1 and Type 2 Diabetes are a risk for increased maternal and infant morbidity and mortality in Pakistan and worldwide. Screening pregnant mothers for gestational diabetes is essential to prevent complications. Good glycaemic control is critical in the preconception, antenatal, intrapartum and post partum period for a better outcome for both mother and the newborn infant. Health care providers need to be alert throughout pregnancy, as well as before and afterwards, as many of the complications of Diabetes in pregnancy, including early pregnancy loss and anomalies, are preventable with appropriate glycaemic control.

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