



## **Chapter 37**

### **DIABETES**

Meticulous glucose control pre-conceptually, as well as throughout pregnancy and childbirth is mandatory for the woman known to have diabetes in order to achieve the best perinatal outcome.

#### **(A) CARE OF WOMEN WITH PREGNANCIES COMPLICATED BY DIABETES MELLITUS**

##### **I PRECONCEPTION MANAGEMENT**

###### **Preconception Counselling**

###### **Education:**

- \$** risk of congenital anomalies and methods to prevent malformations
- \$** risk of fetal/neonatal complications
- \$** risk of maternal diabetes related and obstetric related complications
- \$** importance of strict metabolic control

###### **Preconception Assessment**

- General medical assessment – glucose control, hypertension, vascular disease, presence of neovascularization
- Retinopathy – ophthalmologic examination
- Nephropathy – urinalysis, serum creatinine, 24 hour urine for creatinine clearance/protein/microalbumin
- IHD (ischemic heart disease)
  - (>35, DM > 15 years)
  - EKG
- GI - diabetic gastroparesis, constipation

###### **Diet**

- Modification as required to achieve strict glycemic and metabolic control
- Folate supplementation – 1 mg/day to begin > 6 weeks preconceptually<sup>2</sup> (recent information suggests that high doses of folic acid-5mg/day, in conjunction with a multiple vitamin, may contribute to overall reduction in malformation rate).

###### **Insulin**

- Split multi dose regimen – insulin 3 or 4 x/day to achieve strict glycemic control
- Regular, lente formulations
  - \*Type II DM on oral hypoglycemics to be switched to insulin

## **Glycemia**

Goal – “euglycemia”

- Fasting 4-6 mmol/L
- 1 hour pc glucose < 7.8 mmol/L (or rise of < 2 mmol/L)
- HgbA<sub>1C</sub> within the normal range (normal range varies between laboratories)

## **Monitoring**

- Self blood glucose monitoring (glucometer)
- Blood glucose ac meals, and qhs plus pc meals daily
- Glycosylated Hgb (HgbA<sub>1C</sub>), repeat every 2 months

## **II ANTENATAL MANAGEMENT**

### **First Visit**

- Risk Assessment – obstetrical/medical history
- Diagnostic evaluation for DM vasculopathy (unless completed within 6 months)
- Retinopathy – ophthalmologic consultation
- Nephropathy – urinalysis, serum creatinine, 24 hours urine for creatinine clearance/total protein excretion/microalbumin
- Ischemic heart disease
  - (>35, DM > 15 years) EKG
- GI

### **Education**

- Importance of glucose control in reducing malformation rate and reducing the risk of maternal/fetal morbidity and mortality

## **Antenatal Care**

### **Diagnostic evaluation for DM embryopathy**

- HgbA<sub>1C</sub>
- Offer Quadruple Screen at greater than or equal to 15 weeks-offer IPS if seen prior to 11-14 weeks
- Fetal anatomic survey – 18 weeks
- Fetal echocardiography – 18-20 weeks

### **Maternal Surveillance**

- OB/Endocrinology visits every 4 weeks until 28 weeks, then bi-weekly to 36 weeks (may be modified for medical or obstetrical reasons)

- Hospital admission – poor glucose control, obstetrical indications, fetal indications
- Patients with underlying nephropathy – 24 hour urine, serum creatinine every month
- Retinopathy – ophthalmologic examination every trimester
- Urine culture every trimester

### **Diet**

- 7500 KJ diabetic diet

### **Glycemia Monitoring**

(see preconception)

### **Fetal Surveillance**

- Fetal movement counts – after 28 weeks
- Growth assessment – Ultrasound 28-30 weeks and every 4 weeks thereafter (may be individualized)
- Actively look for growth restriction in patients with vascular disease

### **Antepartum Fetal Testing**

- a) good control, no macrosomia, no vascular disease – weekly Non Stress Test (NST) after 32 weeks, amniotic fluid volume measurement every 2 weeks [Biophysical Profile Score (BPP)] NST 2 x/week after 37 weeks
- b) poor control, macrosomia, vascular disease-weekly NST after 28 weeks, amniotic fluid volume measurement weekly (BPP), NST 2 x/week after 37 weeks
- c) Use of dopplers to assess for evidence of placental insufficiency if indicated

### **Birth**

Timing of birth should be individualized based on **four** factors (all charts reviewed at 36 weeks)

1. Glycemic control
2. Maternal complications (pre-existing or developing vascular disease or hypertension, obstetrical factors)
3. Fetal wellbeing (antenatal testing, macrosomia)
4. Insulin Requirements

### **Principles**

- I. Patients with good glycemic control in the absence of maternal complications and fetal macrosomia or growth restriction are allowed to achieve spontaneous labour. In the absence of spontaneous labour, gestation should not go beyond 40 weeks.

- II. Delivery of patients in poor metabolic control, or with evidence of deterioration of maternal condition, or with fetal growth restriction is individualized based on clinical circumstances.
- III. Patients with a sudden drop in insulin requirements (>30% in 24-48 hours) may require increased surveillance or consideration for delivery

### **III INTRAPARTUM MANAGEMENT**

#### **Patients On Insulin**

- 1. Nutrition – clear fluids within the calorie count of her normal diabetic diet
- 2. IV:D5W/NS or D%W/0.45NS at 100 cc/hr
- 3. Insulin drip (50 units Humulin regular insulin in 500 cc NS)
  - a) Run at 1u/hour
  - b) Use following sliding scale to change the insulin during labour:
    - Blood Glucose <3mM—stop insulin
    - Blood Glucose 3-4 mM—reduce the insulin by 0.5 u/hour (5cc/hour)
    - Blood Glucose 4-6mM—maintain the insulin infusion at the same rate
    - Blood Glucose >6mM—increase the insulin infusion by 0.5 u (5cc/hour)
- 4. Monitoring
  - Venous glucose initially and every 4 hours until delivery
  - Glucometer every 1 hour until delivery (patient may do her own while feeling well enough during the early part of labour).

### **IV POSTPARTUM MANAGEMENT**

- Insulin requirement postpartum much less than pre labour, sometimes minimal to none (honeymoon period)
- continue IV fluid until drinking well and switch to diabetic diet
- stop insulin infusion following delivery of placenta
- glucometer every 4 hours initially
- Endocrinology will order s/c insulin on an individual basis postpartum

## **(B) PREGNANCIES COMPLICATED BY GESTATIONAL DIABETES MELLITUS (GDM)**

### **Universal Screening**

- Recommend to offer screening of all pregnant women at 28 wks gestation
- 50 gm oral glucose challenge [GCT] (independent of diet, last meal, time of day)
  - normal < 7.8 mmol/L
  - if > 7.8, proceed to 2 hour 75 gm oral glucose tolerance test (OGTT) (GDA Recommendations, 1998)

\*if glucose greater than 10.3, OGTT not required. Initiate gestational diabetes treatment.

### **Individualized Screening for Undiagnosed Type II DM**

- Recommend screening in patients at risk for undiagnosed Type II DM in the first trimester, e.g.
  - previous gestational diabetic requiring insulin
  - previous macrosomic infant (>4500 gm)
  - previous unexplained stillbirth

### **Diagnosis**

- **2 hour 75 gm OGTT** (following 3 days of unrestricted activity and diet >150 gm CHO/day, (CDA Recommendations, 1998)
- Diagnostic criteria (CDA Criteria, 1998)
  - serum glucose fasting...

0 hr	≥	5.3	mmol/L
1 hr	≥	10.6	mmol/L
2 hr	≥	8.9	mmol/L

Based on these criteria, patients are classified as . . .

- (a) Gestational Diabetes – 2 or more abnormal values
- (b) Glucose Intolerance of Pregnancy – 1 abnormal value
- (c) Likely unrecognized Type II DM – elevated fasting glucose-but cannot be diagnosed in pregnancy!!

### **Management**

- (a) **Gestational Diabetes Mellitus**
  - Referral to dietician
  - Consultation to obstetrician
  - Consultation to endocrinologist

- **Dietary Management**

Breakfast	25 g
morning snack	25 g
Lunch	30 g
afternoon snack	25 g
Dinner	40 g
evening snack	25 g
bedtime snack	30 g

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<b>Total Carbohydrate</b>	<b>200 g</b>
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- **Insulin Therapy**

Institute insulin if elevated pc blood glucoses (1 hr pc  $\geq$  7.3 mmol/L) or elevated fasting ( $>$ 5.3 mmol/L)
- **Glucose monitoring**
  - (i) diet alone  
Glucometer – fasting and pc meals (fasting  $<$  5.3, 1 hr pc  $<$  7.8 mmol/L)
  - (ii) diet and insulin  
As pregestational DM (see pathway for Pregestational DM)
  
- (b) Glucose Intolerance of Pregnancy**

Referral to dietician  
Diet – as GDM – see above  
Glucose monitoring
  - none
  - repeat 2 hr OGTT at 34 wks
  
- (c) Unrecognized Type II DM**

Treat as pregestational DM

### **Fetal Surveillance**

- (a) GDM (diet controlled)**
  - Fetal movement counts – initiate at 37 wks
  - Growth assessment – Serial ultrasound individualized based on clinical suspicion for macrosomia, or intrauterine growth restriction
  - Antepartum fetal testing – institute weekly NST or biophysical profile (BPP) after 40 weeks, may institute at 37 weeks if poor control, polyhydramnios, or macrosomia
- GDM (requiring insulin)**
  - As for pregestational DM (see pathway for pregestational DM)
  
- (b) Glucose Intolerance of Pregnancy**
  - None, except when indicated for other obstetrical reasons

**(c) Likely unrecognized Type II DM**

- As for pregestational DM – see pathway for pregestational DM

**Birth - For Diet Controlled GDM**

Timing of birth individualized based on three factors:

1. Glycemic control
2. Maternal complications (pre-existing or developing hypertension or other obstetrical factors)
3. Fetal wellbeing (antenatal testing, macrosomia)

In general, patients under good glycemic control and in the absence of maternal complications and fetal macrosomia may achieve spontaneous labour or be induced as per postdates criteria.

Delivery of patients in poor metabolic control, or with evidence of preeclampsia, or with suspected fetal macrosomia, growth restriction or polyhydramnios is individualized based on clinical circumstances.

**Intrapartum Management**

**GDM (diet controlled)**

1. Nutrition – clear fluids (calorie count of GDM diet)
2. IV D%/0.45 NS at 100 cc/hr
3. Monitoring – venous glucose initially and every 4 hrs until delivery  
- glucometer every 1 hr
4. Insulin infusion if glucose > 6.5 mmol/L

**GDM (requiring insulin)**

As for Pregestational DM (see Pathway for Pregestational DM)

**Postpartum Management**

**Gestational DM (diet controlled)**

- Education – diet, exercise, weight reduction
- Recurrence risk of gestational DM 60-70%
- Risk of Type II DM 40-60%
- OGTT in 3 months

**Gestational DM (requiring insulin)**

- stop the insulin infusion as soon as placenta is delivered
- IV fluid orders then as per OB concerns

- diet to be DAT postpartum
- monitoring: a 2 hr pc glucose is ordered on the 2nd day postpartum
- Education – see above

### **References**

1. Meltzer, Sara, et al. **1998 Clinical practice guidelines for the management of diabetes in Canada.** CMAJ 1998; 159 (8 Suppl)
2. Society of Obstetricians and Gynecologists of Canada (SOGC), **Policy Statement**, No. 19, March 1993.