PBL
HYPERTENSION IN PREGNANCY
AND
DIABETES IN PREGNANCY

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CASE # 1

HISTORY:

A woman attends the antenatal clinic to discuss her GTT. She is 42 years and this is her 6th pregnancy. She has previously 3 CS, 1 early miscarriage & a termination of pregnancy. All booking tests were normal as were her 11-14 – week anomaly scan ultrasound. The woman is now 26 weeks gestation and GP arranged a GTT because of family history of type 2 DM (her father & paternal aunt)

Case #1

Examination :

Her BMI= 31 kg/ $m^{2.}$. BP= 146/87 mmHg. The symphysis-fundal height* is 29 cm and FHR is normal on auscultation.

Investigations :

Urinanalysis: 1 + glycosuria

The 75 gm GTT:

Pretest fasting blood glucose = 6.4 mmol/l (= 115 mg/dl)

2 hour blood glucose = 11.3 mmol/l (204 mg/dl)

*. SFH = corresponds to GA from 16-36 weeks

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QUESTIONS :

- What is the diagnosis and on what criteria can this be made?
- What are the principles of management for this patient?

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The diagnosis is of gestational diabetes mellitus (GDM) and is based on the 2 h glucose concentration exceeding 11.1 mmol/L (World Health Organization (WHO) criteria). The diagnosis may also be made if the fasting blood glucose exceeds 7.8 mmol/L, in which case a formal glucose tolerance test would not have been necessary. Transient glycosuria is common in pregnancy and may occur after a glucose-rich drink or snack. Therefore the urinalysis alone is unhelpful in the assessment of this woman.

GDM occurs in up to 3 per cent of the pregnant population depending on the ethnic diversity of the specific population. In some cases it may be the first presentation of previously undiagnosed diabetes.

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Box 1. Risk factors for gestational diabetes

- Body mass index more than 30 kg/m²
- Previous macrosomic baby weighing 4.5 kg or more
- Previous gestational diabetes
- Family history of diabetes (first-degree relative with diabetes)
- Family origin with a high prevalence of diabetes:
  - South Asian (specifically women whose country of family origin is India, Pakistan or Bangladesh)
  - Black Caribbean
  - Middle Eastern (specifically women whose country of family origin is Saudi Arabia,United Arab Emirates, Iraq, Jordan, Syria, Oman, Qatar, Kuwait, Lebanon or Egypt)

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The importance of the diagnosis relates to the effect on the mother and fetus.

- *Effects on the fetus*:
  - fetal macrosomia
  - polyhydramnios
  - neonatal hypoglycaemia
  - neonatal respiratory distress syndrome
  - increased stillbirth rate
- *Effects on the mother*:
  - increased risk of traumatic delivery (e.g. shoulder dystocia)
  - increased Caesarean section risk
  - increased risk of developing GDM in subsequent pregnancies
  - 50 per cent increased risk of developing type 2 diabetes within 15 years

Case#1

Management principles

- Optimal control of maternal blood glucose minimizes the chance of fetal complications. This needs the multidisciplinary input of a diabetologist, specialist diabetes nurse, dietitian, specialist midwife and obstetrician.
- Dietary advice and counselling are the initial interventions (reduced fat and carbohydrate intake with weight control).
- Blood glucose monitoring at home should be initiated with pre- and post-prandial levels at each meal.
- Oral hypoglycaemics are contraindicated in pregnancy.
- If blood glucose measurements are repeatedly high, insulin should be commenced.

Case#1

- The fetus should be monitored with regular ultrasound scans for growth and liquor volume (polyhydramnios being a sign of fetal polyuria secondary to excessive glucose level).
- Delivery should be planned by 40 weeks, but Caesarean section should be performed for obstetric indications only.
- Sliding-scale insulin should be initiated in labour for women on insulin.
- The insulin can be stopped immediately postpartum as normal glucose homeostasis returns rapidly after delivery.
- The fetus should be carefully monitored for neonatal hypoglycaemia.
- The mother should have a repeat glucose tolerance test 6 weeks postpartum to rule out pre-existing diabetes.

Key Points

- Up to 7% of pregnancies are complicated by diabetes mellitus, and rates of gestational diabetes are rising worldwide with the increase in obesity and sedentary lifestyle.
- Gestational diabetes increases the risk of gestational hypertension, preeclampsia, cesarean delivery, and developing diabetes later in life.
- Screening for gestational diabetes usually occurs at 24 to 28 weeks' gestation, but early screening is recommended *in women with risk factors.*
- Screening thresholds for the one-hour glucose challenge have ranged from 130 mg per dL (7.2 mmol per L) to 140 mg per dL (7.8 mmol per L).

Key Points

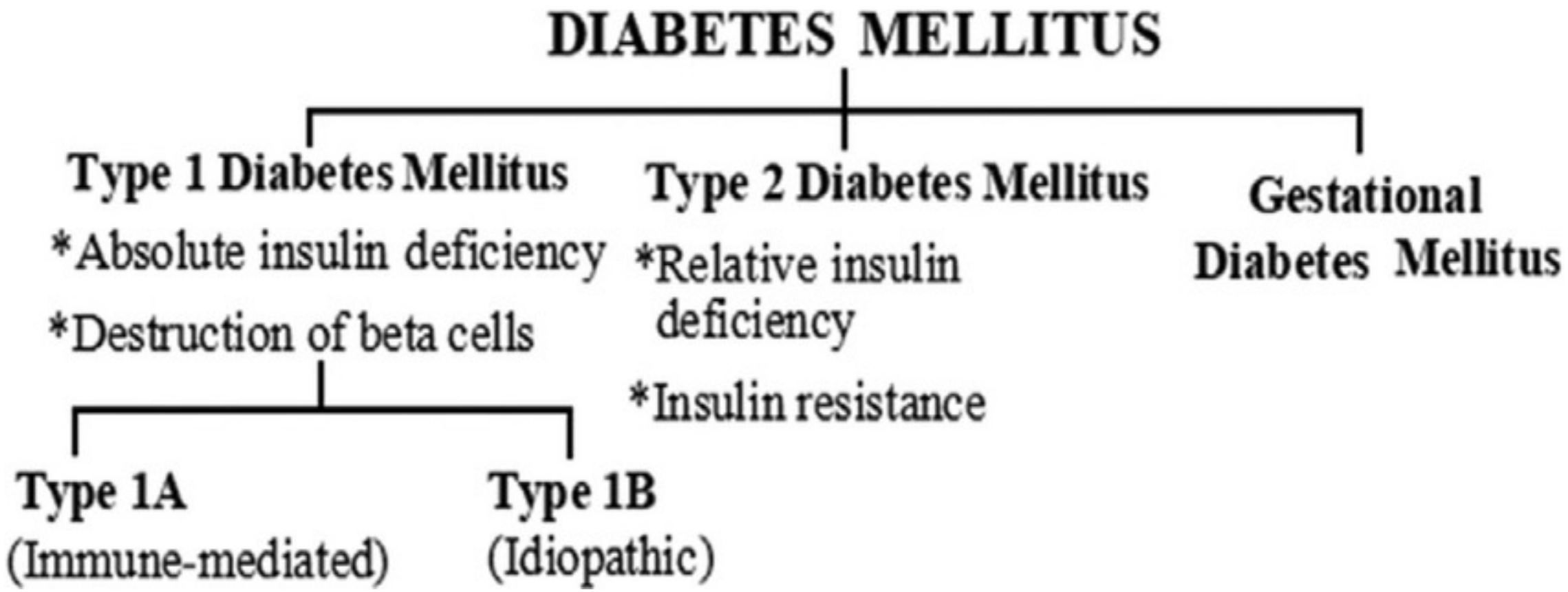
GDM diagnostic threshold values from various organizations

		Plasma glucose concentration thresholds (mg/dl)			
Organization	**OGTT glucose load**	**Fasting**	**1-hour**	**2-hour**	**3-hour**
ADA*	100 g	95	180	155	140
ACOG*	100 g	105	190	165	145
WHO§	75 g	126	-	140	-
IADPSG§	75 g	92	180	153	-

*Diagnosis of GDM if two or more glucose values equal to or exceeding the threshold values §Diagnosis of GDM if one or more glucose values equal to or exceeding the threshold values GDM: Gestational Diabetes Mellitus, OGTT: Oral Glucose Tolerance Test, ADA: American Diabetes Association, ACOG: American Council of Obstetricians and Gynecologists, WHO: World Health Organization, IADPSG: International Association of Diabetes and Pregnancy Groups

- According to these criteria the diagnosis of GDM is made if there is at least one abnormal value (≥**92, 180 and 153 mg/dl** for fasting, one-hour and two-hour plasma glucose concentration respectively), after a 75 g oral glucose tolerance test (OGTT).

Key Points


DIABETES MELLITUS
Type 1 Diabetes Mellitus
*Absolute insulin deficiency
*Destruction of beta cells
Type 1A
(Immune-mediated)
Type 1B
(Idiopathic)
Type 2 Diabetes Mellitus
*Relative insulin deficiency
*Insulin resistance
Gestational Diabetes Mellitus

Modified White's classification of DM in pregnancy:

Class	Age of onset	Duration	Vascular disease	Treatment
A	Any	Any	None	Diet alone
A_1	During pregnancy		None	Diet alone
A_2	During pregnancy		None	Diet, insulin
B	>20 yrs	<10 yrs	None	Diet, insulin
C	10–19 yrs or	10–19 yrs	None	Diet, insulin
D	<10 yrs or	>20 yrs	Benign hypertension, background retinopathy	Diet, insulin
F	Any	Any	Nephropathy	Diet, insulin
R	Any	Any	Proliferative retinopathy	Diet, insulin
H	Any	Any	Cardiac disease	Diet, insulin
T	Any	Any	Renal transplant	Diet, insulin

Key Points

- Gestational diabetes should be treated with *nutrition therapy & weight advice.*
- If medications are needed, *insulin and oral medications are equally effective and appropriate for first-line therapy.* Oral medications (e.g., glyburide, metformin [Glucophage]).
- Women with gestational diabetes *should be screened again at six to 12 weeks postpartum.*
- *One third* of women with impaired glucose tolerance in pregnancy will develop DM in the next 25 years.

Key Points

Glycemia goals include:

- Fasting and pre-meal glucose ≤ 95 mg/dl
- 1-hour postprandial ≤ 140 mg/dl
- 2-hour postprandial ≤ 120 mg/dl
- Carbohydrate controlled diet regimens
- Insulin requirements will increase throughout pregnancy, most markedly between 28 weeks and 32 weeks of gestation

Case #2

Case#2

Description of Case

History:

A 21-year-old pregnant woman, gravida 2 para 1, presented with hypertension and proteinuria at 20 weeks of gestation. She had a history of pre-eclampsia in her first pregnancy one year ago. During that pregnancy, at 39 weeks of gestation, she developed high blood pressure, proteinuria, and deranged liver function. She eventually delivered by emergency caesarean section following failed induction of labor. Blood pressure returned to normal post-partum and she received no further medical follow-up. Family history was remarkable for her mother's diagnosis of hypertension in her fourth decade. Her father and five siblings, including a twin sister, were healthy. She did not smoke nor drink any alcohol. She was not taking any regular medications, health products, or herbs.

Case#2

Description of Case (cont.,)

Physical exam:

- At 20 weeks of gestation, blood pressure was found to be elevated at 145/100 mmHg during a routine antenatal clinic visit. Aside from a mild headache, she reported no other symptoms. On physical examination, she was tachycardic with heart rate 100 beats per minute. Body mass index was 16.9 kg/m^2 and she had no cushingoid features. Heart sounds were normal, and there were no signs suggestive of congestive heart failure. Radial-femoral pulses were congruent, and there were no audible renal bruits.

Case #2

Description of Case (cont.,)

Investigations:

- Baseline laboratory investigations showed normal renal and liver function with normal serum urate concentration. Random glucose was 3.8 mmol/l. Complete blood count revealed microcytic anemia with hemoglobin level 8.3 g/dl (normal range 11.5–14.3 g/dl) and a slightly raised platelet count of 446 × 10^9/l (normal range 140–380 × 10^9/l). Iron-deficient state was subsequently confirmed. Quantitation of urine protein indicated mild proteinuria with protein: creatinine ratio of 40.6 mg/mmol (normal range <30 mg/mmol in pregnancy).

Case#2

What Were Our Differential Diagnoses?

- An important cause of hypertension that occurs during pregnancy is **pre-eclampsia**. It is a condition unique to the gravid state and *is characterized by the onset of raised blood pressure and proteinuria in late pregnancy, at or after 20 weeks of gestation* . Pre-eclampsia may be associated with hyper-uricemia, deranged liver function, and signs of *neurologic irritability such as headaches, hyperreflexia, and seizures.* In our patient, hypertension developed at a relatively early stage of pregnancy than is customarily observed in pre-eclampsia. Although she had proteinuria, it should be remembered that this could also reflect underlying renal damage due to chronic untreated hypertension. Additionally, her electrocardiogram showed left ventricular hypertrophy, which was another indicator of chronicity.

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What Were Our Differential Diagnoses? (cont.)

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Key Points

Causes of Hypertension in Pregnancy

1. Pre-eclampsia
2. Gestational hypertension
3. Chronic hypertension : may be due to
   - Renal artery stenosis
   - Glomerulopathy
   - Renal parenchyma disease
   - Primary hyperaldosteronism (Conn's adenoma or bilateral adrenal hyperplasia)
   - Cushing's syndrome
   - Phaeochromocytoma
   - Coarctation of aorta
   - Obstructive sleep apnea

Key points

- *Hypertension:* Blood pressure of 140 mmHg systolic or higher, or 90 mmHg diastolic or higher [NICE 2019]
- *Chronic hypertension* Hypertension that is present at the booking visit, or before 20 weeks, or if the woman is already taking antihypertensive medication when referred to maternity services. It can be primary or secondary in etiology.
- *Eclampsia:* A convulsive condition associated with pre-eclampsia.
- *Gestational hypertension :* New hypertension presenting after 20 weeks of pregnancy without significant proteinuria.
- *HELLP syndrome* Hemolysis, elevated liver enzymes and low platelet count.

Key points

Pre-eclampsia : New onset of hypertension (over 140 mmHg systolic or over 90 mmHg diastolic) after 20 weeks of pregnancy and the coexistence of 1 or more of the following new-onset conditions:

A- proteinuria (urine protein/creatinine ratio of 30 mg/mmol or more or or albumin/creatinine ratio of 8 mg/mmol or more, or o at least 1 g/litre [2+] on dipstick testing) or ;

B- **other maternal organ dysfunction:**

1— renal insufficiency (creatinine 90 micromol/litre or more, 1.02 mg/100 ml or more)

2— liver involvement (elevated transaminases [alanine aminotransferase or aspartate aminotransferase over 40 IU/litre] with or without right upper quadrant or epigastric abdominal pain)

3— neurological complications such as eclampsia, altered mental status, blindness, stroke, clonus, severe headaches or persistent visual scotomata

4— haematological complications such as thrombocytopenia (platelet count below 150,000/ microlitre), disseminated intravascular coagulation or hemolysis

C-Uteroplacental dysfunction such as fetal growth restriction, abnormal umbilical artery doppler waveform analysis, or stillbirth.

Key points

- *Severe hypertension :* Blood pressure over 160 mmHg systolic or over 110 mmHg diastolic.
- *Severe pre-eclampsia:* Pre-eclampsia with severe hypertension that does not respond to treatment or is *associated with* ongoing or recurring severe headaches, visual scotomata, nausea or vomiting, epigastric pain, oliguria, as well as progressive deterioration in laboratory blood tests such as rising creatinine or liver transaminases or falling platelet count, or failure of fetal growth or abnormal Doppler findings.

Key points

Objectives of treatment:

- Prevention : Aspirin 75-150 mg /day starting from week 12 to birth (or 36w)
- Control hypertension: labetalol, nifedipine, methyl dopa- avoid ACE inhibitors and ARBs during pregnancy as they are teratogenic. Avoid also thiazides or thiazide-like drugs during pregnancy.
- Monitoring fetal growth and wellbeing: serial ultrasound fetal growth evaluation, umbilical artery doppler waveform, amniotic fluid volume estimation.
- Prevention of complications e.g eclampsia in severe preeclampsia with MgSO4

Thanks