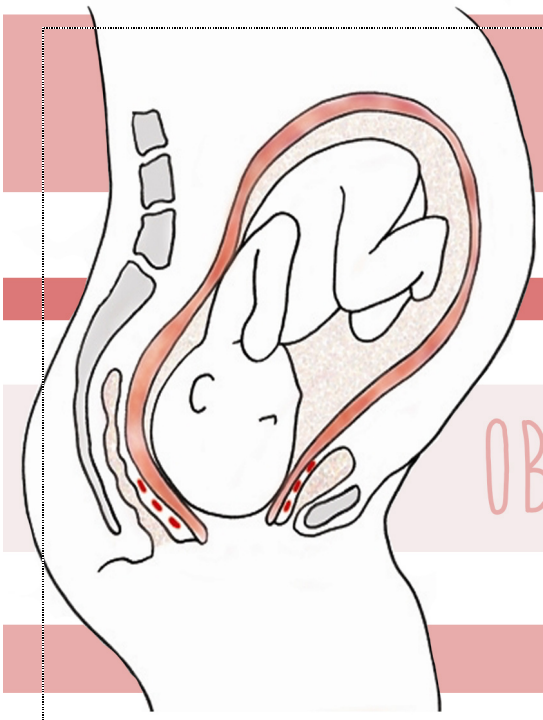

OBSTETRICS AND GYNECOLOGY

(4) Diabetes in Pregnancy

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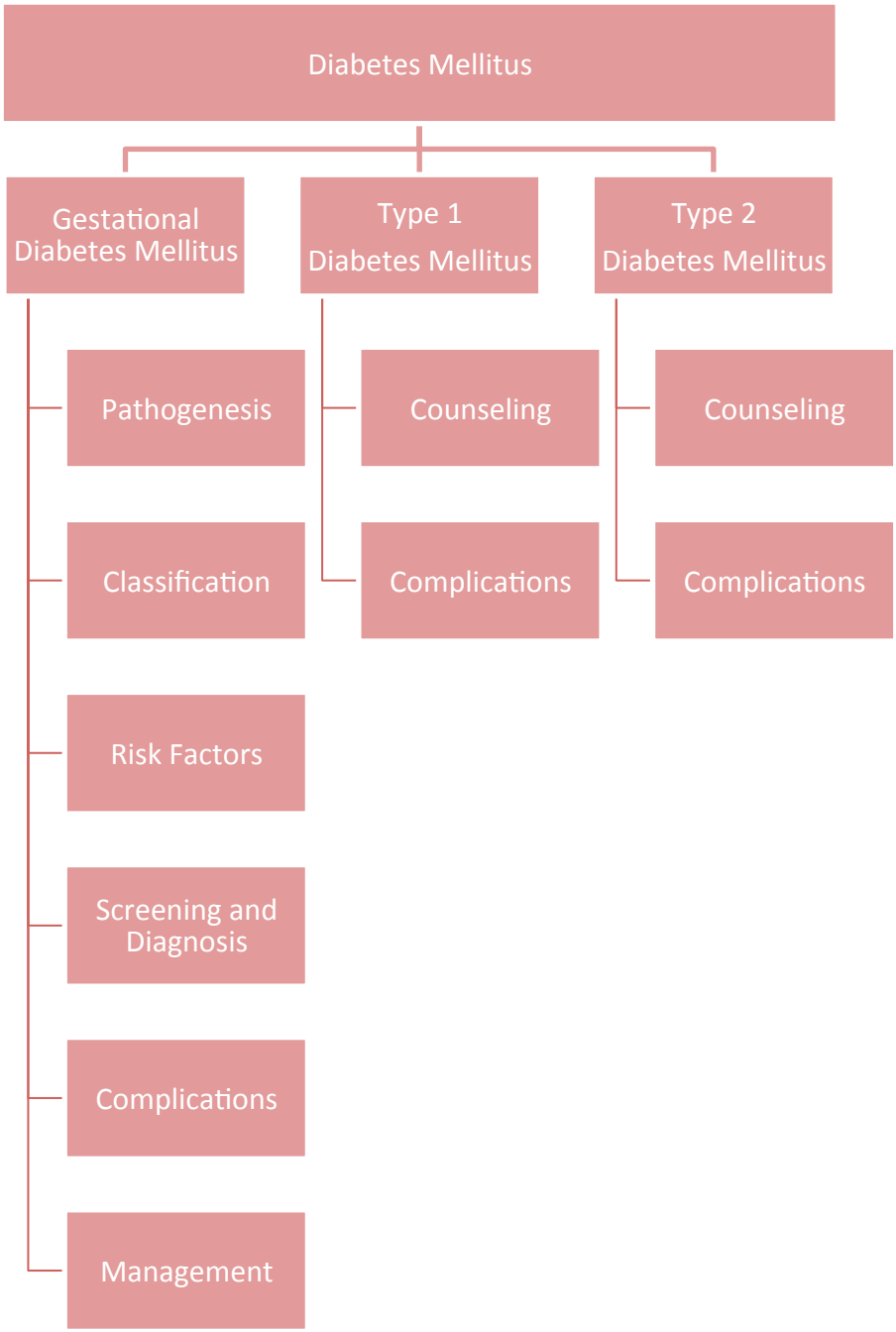
Doctor's note Team's note Not important Important 431 teamwork

Objectives:

Not Given



Type 1 & 2 Diabetes Mellitus

Type 1 DM	Type 2 DM
Formerly known as: Juvenile-onset or IDDM (Insulin Dependent Diabetes Mellitus)	Formerly known as: Adult-onset or NIDDM (Non-Insulin Dependent Diabetes Mellitus)
Absolute insulin deficiency	Tissue resistance to insulin
Increased risk of chronic micro vascular disease at an early age	Lower incidence of micro vascular disease during reproductive age range
Incidence in UK 0.5%	Incidence in UK 3-4%, more in Asian
Causes: Autoimmune or Viral Infection	Rarely seen because women who have type 2 DM are usually too old to get pregnant

Prepregnancy counseling (for types 1,2)

1- high dose **folic acid** 5 mg (400 Microgram) up to 12 weeks (whereas non-diabetic mothers usually only take 1mg).

2- evaluate **renal function** (24 h urine collection for protein, creatin ine clearance)

3- full **history and examination**, **advise for diet**, **body weight**, and **exercise**.

4- ophthalmology referral (for retinopathy)

5- Echo (> 30 y, smoker, hypertensive)

6- cardiologist referral if suspected cardiac illness.

7- monitor **medications** : ACEI (cause oligohydramnios, renal failure, skull defects) (use methyldopa for HTN instead)

8- Aspirin if risk of preeclampsia

9- HBA1C<6.1 if decreased less congenital anomalies (HBA1c in preg not sensitive) (good to evaluate long-term control)

HBA1C ≥ 9.5 % carries >20% fetal major anomalies (advice women HBA1C >10% to avoid pregnancy)

10- Stop OHA (Oral Hypoglycemic Agent) and **start insulin** if required (apart from metformin safe during pregnancy)

11- Explain to the woman with DM controlling her BS will reduce risks but not eliminating risk of hypoglycemia and impaired awareness (nausea and vomiting can affect BS)

✪FBS is usually low in pregnancy due to increased renal clearance.

✪In non-diabetic increase in insulin to 50% to overcome the resistance

✪Type 1 DM: ↑ insulin requirement 3 times the normal dose (we should admit type 1 DM patients to control during organomegaly to prevent anomalies early in pregnancy)

Risks of DM to Mother:

•Hypoglycemia: random blood sugar <3.9 mmol/L (because of the tighter control attempted at pregnancy)

•Nephropathy 5-10% of DM (all DM complications worsen with pregnancy)

•Chronic hypertension

•Preeclampsia

•Preterm

•Rapid progression of microvascular and atherosclerotic disease (IHD, HF, Cerebral ischemia)

•DKA (Diabetic ketoacidosis):

Life threatening, can occur at lower blood glucose <200

Fetal mortality 10-30%

Maternal mortality is rare due to proper Rx.

Tx: rehydration, insulin, K, and antibiotics

•Infections:

(UTI must always do culture to screen all mothers (even if not diabetic), Respiratory, endometrial,wound, vaginal candidiasis)

•Increase C/S: Due to early induction of labour, macrosomia

Fetal complications:

•Miscarriage when ↑Hba1c (due to congenital anomaly from DM 1)

•**Congenital malformation** 4% (with type 1 DM only)

- 6-10% of diabetic mothers have major congenital anomaly

  - **Cardiac** (most common) (transposition of great vessels VSD , ASD, hypoplastic left ventricle , aortic anomalies , complex cardiac anomaly)

  - **CNS** anomalies increase 10 fold. Check alpha-fetoprotein (Neural Tube Defects)

  - **GIT** malformation

  - **Genitourinary** anomalies (poly cystic kidneys)

  - **Sacral agenesis** (caudal regression):

    Rare: 400 times more frequent in DM (although rare, when seen it means the mother is diabetic)

- Increased prenatal mortality (chronic hypoxia, hyperglycemia) (so we usually induce labor at 38 weeks ourselves to prevent it)

- Macrosomia (with type 2 DM and GDM):

  Weight 4-4.5 kg (90th percentile)

  25- 42% of diabetic

  3 fold increase in shoulder dystocia (Outcome: fracture, Erb's palsy)

- IUGR (uncontrolled type 1 DM) (due to microvascular disease)

- IUFD 32-36 weeks in uncontrolled D.M (chronic hypoxia)

Book: Fetal demise is most likely due to acidosis, hypotension from osmotic diuresis, or hypoxia from increased metabolism coupled with inadequate placental oxygen transfer

Gestational Diabetes Mellitus

Carbohydrate intolerance first occurs during pregnancy or first detected during pregnancy (even if she had it before but was only detected during pregnancy and regardless of whether it resolves after pregnancy or not)

4-5% of pregnancies are complicated by DM

90% of DM in pregnancy is caused by GDM

GDM will increase sevenfold risk of type 2 DM (20-30%)

Pathogenesis

(a) Increased insulin resistance in second trimester and progresses as pregnancy advances due to hormones (estrogen, progesterone ,cortisol, prolactin and human placental lactogen) (so need to increase insulin dose gradually as pregnancy advances)

(b) Placental degradation of insulin

Historical Classification of White (Still used by some experts) **Not Required**

A	Asymptomatic but abnormal GTT
B	Onset ≥ 20 y Duration < 10 y No vascular complications
C	Onset 10-19 y Duration 10-19 y No vascular complications
D	Onset < 10 y Duration ≥ 20 y Vascular disease, Benign retinopathy, and Leg artery calcification

Gestational DM risk group should memorize :

Obese (BMI >30 kg/m2)

History of GDM

Family history (first relative) of D.M

> 25 Y

Previous macrosomic baby (≥4.5 kg)

PCO

Twin pregnancy

Racial (Asians, Hispanic, African – Caribbean, also gulf countries are high risk)

Screening and diagnostic tests:

(1) UK (NICE Guidelines) (just for your knowledge) Screening and diagnostic**:**

Whom: selective if +ve risk factors without regard to age. 10% missed

How: at 24-28 weeks (that is when resistance starts to manifest) We measure serum glucose while patient is fasting then we give 75 gm OGTT and measure serum glucose after 2 hours

Fasting should be <7 (NICE Guideline website says <5.6mmol/L

2h serum glucose should be < 7.8 mmol/L

One reading is required to be abnormal

If previous history of GDM:

The test to be done as soon as possible after booking, if normal repeat the test at 24 to 28 weeks

(2) American Congress of Obstetricians and Gynecologists (ACOG) the one we use in KKUH also done at 24-28 wks**:**

2 Step approach

Universal, more practical and cost-effective, sensitive, no screening if <25 y if no risk factor

Step 1 Screening Test (discovers 90% of D.M):

(1) 50 gm oral glucose challenge (no fasting required)

(2) then check serum glucose at I hour

(3) If serum glucose ≥130mg/dl (7.2mmol/L) ➔Step 2

Step 2 Diagnostic Test:

(1) Patient comes fasting then we do 3 hour GTT glucose tolerance test (100 gm) or 75 gm GTT (2hrs).

(2) If abnormal fasting or any two abnormal readings (greater than the following table) then diagnose DM

	75 g	100 g
Fasting	5.3	5.3
After 1 hr	10	10
After 2 hrs	8.6	8.6
After 3 hrs		7.8

Follow up GTT can be done 32-34 w (to identify late onset DM)

(3) Diagnosis of GDM either :

FBS ≥ 5.6 mmol/L (no need for extra tests)

Or 2 hr post glucose ≥ 7.8 mmol/L

Complications of GDM

- Preterm labor
- ↑ B.P
- ↑ c/s rate
- Recurrent GDM
- Type 2 DM
- Neonatal hypoglycemia
- ↑ Bilirubin level and jaundice
- Later on obesity, impaired GTT and DM
- Intellectual
- Macrosomia:

  Cause: Glucose will pass to fetus by facilitated diffusion ➔ increased insulin production by fetus ➔ act as growth factor ➔ growth of cells ➔ macrosomia, organomegaly, polycythemia(Hct more that 65%), hypoglycemia, low Calcium ,low magnisum, Respiratory Distress Syndrome (RDS), Neurological and Neuromuscular disease (NND)

Fetal cardiac septal hypertrophy and hypertrophic cardimyopathy.

Management

- Multidisciplinary (physician, midwife, obstr.nurse, nutrition consultant)
- Referral urgently for control of DM
- Diet: CHO 40% of total calories, vegetables, fruits of high fibers (1800 kcal/day ➔ 2400 kcal/day)
- Exercises: walking, yoga, swimming, upper arm ex (30 min /day)
- Glucose monitoring "glucometer" at home and to be reviewed every 1-2 weeks
- **GDM , DM type 2 on single insulin dose:** do fasting , one hour post meal daily.
- **DM type 1, DM type 2 on multiple insulin:** fasting pre and post meal and bedtime.

If FBS < 7: diet and exercise for 1-2 weeks

If no response add Metformin

Insulin if Metformin unacceptable to the patient (some mothers are afraid it's teratogenic)

If FBS More than or equal 7 : Immediate insulin +_ metformin

If FBS 6-6.9 consider insulin +_ metformin(if hydramnios or macrosomia)

Target Blood glucose level below :

fasting 5.3 mmol/L

One hour pp (post prandial) 7.8 mmol/L

2 hours pp 6.4

Antenatal follow up:

1) **1st trimester:** admit to control blood sugar, retinal, renal check up

2) **7-8 weeks:** u/s for viability to rule out ectopic

3) **16 weeks:** retinal exam if abnormal 1st visit

4) **20 weeks:** u/s for heart and other structures

5) **28 weeks:** u/s for growth and amniotic fluid and retinal exam if normal in 1st trimester

6) **32 weeks:** u/s for growth

7) **36 weeks:** u/s for growth

Discuss with pt mode of delivery and timing

8) **38 weeks:** IOL (Induction of Labour) or C/S if wt > 4.5 kg

Maintain blood sugar 4-7 mmol/L during labor

9) **39 weeks:** tests for fetal wellbeing

10) **40 weeks + 6 days:** induction of labour (if GDM and well controlled and compliant)

Book: If **(1)** maternal state is stable, **(2)** blood glucose is in the euglycemic range, and **(3)** fetal studies indicate a healthy baby spontaneous onset of labor at term may be awaited

Cesarean delivery may be elected for large fetuses (>4250 to 4500g)

Since babies of diabetic mothers usually have late surfactant production, if we plan to deliver early (35-37 weeks), we should always give dexamethasone (steroids) to promote formation of lung surfactant and thus prevent Respiratory Fetal Distress Syndrome .

In labour

Maintain BS 4-7 mmol/L, monitor BS every hour.

For type 1 DM or if we couldn't control properly➔ IV Dextrose + insulin.

Post delivery

Risk of hypoglycemia during breastfeeding

½ dose insulin, GDM stop treatment.

Mother should go back to the DM treatment she was on before getting pregnant.

Modify lifestyle, breastfeeding, weight reduction, diet

GDM: risk of DM 20-50% Within 10 y

6/52 POST Partum, do FBS. Advice for weight reduction and exercise

Contraception of any kind is not contraindicated

Summery

Type 1 and 2 DM

- It is very important to counsel diabetic mothers who wish to conceive.
- We must increase insulin dose gradually as the pregnancy advances due to increasing insulin resistance
- Complications: To mother➔ Hypoglycemia, DKA, Infection

  To Fetus➔ Congenital anomalies and IUGR in type 1, Macrosomia in type 2

GDM

- 90% of DM in pregnancy is caused by GDM
- Risk factors: Obesity, History of GDM, Family history of D.M, > 25 Y, Previous macrosomic baby, PCO, Twin pregnancy, Racial
- Must screen all pregnant women at 24-28 weeks using 50 gm oral glucose challenge then for those who are positive perform diagnostic 3 hour GTT.
- Complications of GDM: Neonatal hypoglycemia, later DM in both fetus and mother, Macrosomia
- Management of GDM starts with diet and exercise and if that fails then move on to Metformin followed by Insulin as a final resort.

- If we deliver baby prematurely we must be sure to give dexamethasone to prevent RDS
- Must maintain blood sugar during labour and if we fail to do that we should put patient on IV dextrose + insulin
- After delivery mother should go back to her medication before pregnancy

MCQ's (Pretest) :

Q1. A 35-year-old G1P0 presents to her obstetrician's office at 8 weeks gestation. She has a history of type I diabetes and is very concerned regarding the possible risks this illness may have on her fetus. You recommend that the patient undergo all of the following routine testing because of her diabetes except

a) Maternal serum AFP test at about 18 weeks
b) Serial ultrasound assessments of fetal growth
c) Fetal echocardiography at 18 to 20 weeks
d) Twenty-four-hour urine study
e) Fetal surveillance with contraction stress tests starting at 28 weeks

Q2. Your patient is a 40-year-old G3P2 obese woman at 37 weeks gestation. Her pregnancy has been complicated by insulin-requiring gestational diabetes. Her most recent Hgb A1c was 6.0. The patient reports that her fasting and postprandial sugars have all been within normal range. Her fetus has an estimated weight of 61⁄2 lb by Leopolds today. All of the following are correct ways to manage this patient except

a) The patient should undergo an elective cesarean section at 38 weeks to avoid shoulder dystocia
b) The patient should be induced by 40 weeks if spontaneous labor does not occur
c) After 6 weeks postpartum, the patient should undergo a 75-g glucose tolerance test
d) In the postpartum period, it is acceptable to use oral contraceptives
e) A glucose infusion will be given to the patient in labor

Q1: The answer is e. *(Cunningham, 21/e, pp 1368–1376. Beckmann, 4/e, pp 234–235.)* Fetuses of women with overt diabetes are at increased risk of having spina bifida; therefore patients should be counseled appropriately regarding obtaining a test for maternal serum ⟨-fetoprotein to screen for neural tube defects. Fetal echocardiography is recommended because infants of diabetic mothers have an increased risk of heart anomalies including transposition of the great vessels, ventricular septal defects, and atrial septal defects. Performance of serial 24-h urine samples will document absence of nephropathy by measuring protein and creatinine clearance. In the third trimester, serial ultrasounds should be performed every 3 to 4 weeks to evaluate both excessive and insufficient fetal growth as well as amniotic fluid levels. Beginning at 26 to 32 weeks of gestation, a pro- gram of weekly or twice-weekly fetal surveillance is usually commenced to document fetal well-being. Testing protocols utilize nonstress testing and biophysical profiles. Since contraction stress testing involves using Pitocin to cause uterine contractions, this is not usually used as a first-line surveil- lance test in preterm fetuses.

Q2: The answer is a. *(Cunningham, 21/e, pp 1367–1376. ACOG, Practice Bulletin 30. Beckmann, 4/e, pp 234–236.)* In the well-controlled diabetic patient who does not have any other complications, induction by 40 weeks is usually undertaken. In general, women are offered elective cesarean delivery if the estimated fetal weight is greater than 4500 g to avoid the possible risk of shoulder dystocia with resultant brachial plexus injury to the neonate. Laboring women with gestational diabetes can be managed in labor with a constant infusion of 5% dextrose and an insulin drip as needed. Women with gestational diabetes are at an increased risk of developing diabetes later in life. Therefore, women with GDM should undergo a 75-g glucose tolerance test 2 to 4 months postpartum. Women experiencing gestational diabetes may safely use combination oral contraceptive pills in the postpartum period.

or feedback For mistakes

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