Introduction to Obstetrics

Overview

- Definitions
- Diagnosis
- Dating
- Prenatal Care
- Maternal Physiology
- Fetal Assessment
- Fetal Monitoring
- Normal Labor
- Abnormal Labor
- Induction of Labor
- Vaginal Delivery
- Operative Obstetrics
- VBAC
- Common Obstetrical Disorders
- Obstetrical Emergencies

Definitions

- Birth: complete extraction or expulsion of a fetus from the mother
- Stillbirth: no signs of life at birth
- Neonatal death: death before 29 days
- Preterm: before 259th day (37 completed weeks)
- Term: 260-294 days (37-42 weeks)
- Post-term: 42 weeks and beyond (>295d)

Definitions

- Nulligravid: woman who is not now or ever been pregnant
- Primigravid: pregnant with first pregnancy
- Primapara: woman who has delivered once past the state of viability
- "Primip": short for Primapara. It is NOT a woman who is pregnant for the first time

Definitions

- Multipara: woman who has delivered 2 or more past the state of viability
- Nullipara: never completed a pregnancy beyond 20 weeks
- Parturient: woman who is in labor
- Puerpera: woman who has just delivered

Definitions

The nomenclature to present pregnancy data is referred to as the TPAL system.

T-term deliveries
P-preterm births
A-abs, sab, or ectopics
L-living children
Therefore, a patient who is currently pregnant with her 6th pregnancy, had 2 deliveries at term, one delivery at 35 weeks with twins, 2 miscarriages, and 4 living children would be described as a G6P2124.

The TPAL system is not perfect. It does not take into consideration:

- Route of delivery
- Distinction between spontaneous abortion, intentional abortion, or ectopic
- Twin deliveries with death of a child. For instance, a G1P1001 could represent both a woman with a singleton term delivery and a living child as well as a term twin delivery in which one child has died.

Diagnosis of Pregnancy

“If a woman’s courses be suppressed, and neither rigor nor fever has followed, but she is affected with nausea, you may reckon her to be with child.”

Hippocrates, 400 b.c., *Aphorisms*, Book V, #61,

As your clinical careers develop and mature, make it an early habit, when confronted with a female patient, to ask yourself the simple question: “Could this patient be pregnant?”

NEVER rely on a patient’s assurances or her mother’s assurances that a pregnancy is not possible.
Presumptive Evidence of Pregnancy

Symptoms

• Nausea and/or vomiting
• Fatigue
• Disturbance in urination

Presumptive Evidence of Pregnancy

Signs

• Amenorrhea
• Breast changes
• Discolored vaginal epithelium
• Increased skin pigmentation
• Perception by mother that she is pregnant

Probable Evidence of Pregnancy

• Enlargement of abdomen
• Change in uterine size/shape
• Change in cervix
• Braxton Hicks contractions
• Ballottement
• Physical outline of fetus
• + hCG test

Probable Evidence of Pregnancy

Why is a positive hCG only probable evidence of pregnancy?

Definitive Evidence of Pregnancy

• FHTs identified
• Fetal movement noted by examiner
• Ultrasonographic or x-ray confirmation

Definitive Evidence of Pregnancy

Pregnancy Dating
The most important aspect of obstetrical care is the assignment of an accurate EDD. Every management decision is predicated upon this date.

**Dating Parameters**

- History
- Examination
- Ultrasound

**Naegele’s Rule**

From the FDLMP, add 7 days and subtract 3 months to calculate the EDC:

- EDC: 2/14
- LMP: 5/19
- EDC: 2/20
- LMP: 5/16
- EDC: 2/22
- LMP: 5/18

**Quickening**

In the primagravid patient, fetal movement is usually noted at 20 weeks. In the primaparous patient, this occurs at 18 weeks.
Dating Parameters

Examination

- Uterine size-1st trimester
- Fundal height
- Fetal heart tones

Dating Parameters

Ultrasound

- first trimester
  - plus/minus 3 to 4 days
- second trimester
  - plus/minus 7 to 10 days
- third trimester
  - plus/minus 2 weeks

CRL measurement in centimeters + 6.5 will closely approximate the EGA of the gestation in weeks.

In the third trimester, U/S assessment of EGA is not accurate and should NEVER be used to assign an EDD.

NEVER!
Antepartum Care

The Initial Prenatal Visit

- Risk assessment to include genetic, medical, obstetrical and psychosocial factors
- Physical examination
- Charting – ACOG record
- Laboratory tests
- Assignment of due date
- Patient education

Labs at Initial Visit

- Hemoglobin
- Urinalysis
- Urine culture
- Blood group
- Rh
- Antibody screen
- Rubella status
- Syphilis screen
- Pap smear
- HbsAg testing
- HIV
- Drug screen*
- GC/Chlamydia*
- Cystic fibrosis screen*

Visit intervals: every 4 weeks until 28, then q 2 wk until 36 wk, then weekly

Each visit: BP, wt, UA, Fundal ht, FHT, FM, PTL risks, symptoms and focused assessment

* as indicated

Fundal Height

- Record at every visit
- Fundus usually measures 20 cm at 20 weeks
- One cm/week until 36-37 weeks
- 4 cm discrepancy is significant

15-20 weeks: MSAFP with triple or quad screen
24-28 weeks: screen for gestational diabetes mellitus, give anti-D immune globulin
35-37 weeks: screen for GBS
General Recommendations at Initial Visit

- Active lifestyle
- Sexual activity permissible
- 25# weight gain
- Nutritious diet
- Avoid ETOH/smoking/drugs
- Avoid cat litter box
- Wear lap/safety belt
- Discussion of first trimester screening

Respiratory

- Chest diameter ↑ by 2 cms
- Chest circumference ↑ by 5 cms
- Diaphragmatic excursion ↑ by 4 cms
- 30-40% ↑ in tidal volume

Respiratory rate is unchanged but there is an increased respiratory effort due to progesterone.

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<th>Pregnant</th>
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<td>HCO3</td>
<td>28</td>
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</table>
Maternal Adaptations to Pregnancy:

Cardiac

Resting heart rate is increased 10 bpm.

An EKG in pregnancy is normal with a slight deviation of the electrical axis to the left due to the changes noted on the previous slide.

Remember that ↑ volume → ↑ preload and that ventricular performance in pregnancy is influenced by both the decrease in SVR and changes in pulsatile arterial flow.

As the diaphragm is elevated, the heart is displaced to the left and ↑, and it is rotated along its long axis.

Heart Sounds

- Increase split S1
- Easily hear S3
- Systolic murmur heard 90% of time, greater with inspiration
- Transient diastolic murmur 20% of time
Pregnancy Induced Hypervolemia

- Meet the demands of enlarged uterus
- Protect mother and fetus from effects of impaired venous return when ↑ and supine
- Protection from blood loss associated with delivery

Maternal Adaptations to Pregnancy:

Renal

Structural Changes

- Kidneys enlarge 1 cm 2° to ↑ renal vascular volume and interstitial volume
- Right-sided ureteral dilation 2° to effects of progesterone

GFR and RPF (renal plasma flow) increases by up to 50%.

Glucosuria during pregnancy is NOT necessarily abnormal. It is the result of:

- ↑ GFR
- Impaired tubular reabsorptive capacity

There is no increase in proteinuria due to pregnancy.

Normal value is: 100-300 mg/24°
There is an increase in urinary frequency and total daily urinary output.

Maternal Adaptations to Pregnancy:
Thyroid

Due to the increase in caloric needs, there is an increase in appetite.

The stomach and intestines are displaced by the uterus.
Gastric emptying and transit times are delayed.

Maternal Adaptations to Pregnancy:
GI

Constipation
- Mechanical obstruction caused by the uterus
- ↓ motility
- ↑ H2O absorption
Impaired gallbladder contractions → stasis and with ↑ cholesterol → stone formation

The liver has no Δ in morphology, however, the following LFTs are impacted:

* ↑ Alkaline phosphatase
* ↓ ALT (alanine transaminase)
* ↓ AST (serum aspartate transaminase)
* ↓ Serum albumin

Maternal Adaptations to Pregnancy:

Coagulation

Pregnancy is a hypercoagulable state and in the normal pregnancy, the coagulation cascade is in an activated state.

All clotting factors are increased except factor XI and factor XIII.

Normal fibrinogen in a non-gravid woman is 150-250 mg/dL.

In pregnancy the normal value is 300-600 mg/dL.
Fetal Assessment

- Non-stress test
- Contraction stress test
- Ultrasound
  - Biophysical profile
  - Modified BPP

The NST is based upon the premise that the heart rate of the fetus that is not acidotic or neurologically impaired will accelerate with fetal movement.

The CST is based upon the response of the FHR to uterine stimulation based upon three contractions of at least 40 second duration over a 10 minute period.

CST is negative if no late decelerations or significant variable decelerations.

CST is positive if late decelerations follow 50% or more of contractions.
Biophysical Profile

• Non-stress test
• Breathing movements
• Gross body movement
• Fine motor movement
• Amniotic fluid volume

The modified BPP is an NST and an AFI. It is considered normal if the AFI is >5 and the NST is reactive.

The biophysical profile is a method of fetal assessment that utilizes both the NST and ultrasound.

Each component is scored as either 0 or 2 points.

Fetal Monitoring

Fetal monitoring is comprised of uterine contraction assessment and fetal heart rate assessment.

Contraction assessment

• External tocodynamometer
• IUPC or intrauterine pressure catheter
FHR assessment

- External transducer
- Internal monitoring or scalp lead

FHR assessment

- Rate
  - 110 bpm – 160 bpm
- Variability
  - Absent
  - Minimal (0 – 5 bpm)
  - Moderate (6 – 25 bpm)
  - Marked (>25 bpm)
- Accelerations
- Periodic changes
- Changes over time

Decelerations

- Early
- Variable
- Late

Decelerations

- Early: head compression
- Variable: cord compression
- Late: utero-placental insufficiency

Overview

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- Abnormal Labor
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- VBAC
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- Obstetrical Emergencies

Normal Labor
“I think my water broke!”

• Can either be spontaneous or induced
  – SROM or AROM (spontaneous or artificial)
• Technical term is Amniorrhesis
• If patient is term (>37 weeks, but not in labor) it is referred to as PROM (premature rupture of membranes)
• If patient is pre-term, it is referred to as PPROM (preterm premature rupture of membranes)

Diagnosis of Amniorrhesis

• Pooling
  – noted at time of sterile speculum examination
• Nitrazine
  – pH of vaginal fluid
• Ferning
  – dried microscope slide of vaginal fluid at 400X
• History
  – not helpful

Labor is defined as cervical effacement and dilation in the presence of uterine contractions.

Labor is divided into 3 stages

• 1st Stage of Labor
  – Latent phase
  – Active phase
• 2nd Stage of Labor
  complete dilation to fetal expulsion
• 3rd Stage of Labor
  delivery of fetus until delivery of placenta

Cervical effacement is the progressive softening, thinning, and retraction of the cervix.
The amount of effacement is expressed in percentages and is based upon a digital exam.

**Digital Exam**
- Fetal presentation
- Presenting part
- Membrane status
- Effacement
- Cervical dilation
- Station
- Pelvis

**Chart Entry**

M3 note
3.7.07
09:20 hrs

Patient is now 6 cm, 90% effaced, at a 0 station. LOA. SROM at 0530 hours. Fluid clear. FHTs reactive. Maternal vital signs stable. Continue in anticipation of vaginal delivery.

**Abnormal Labor**

**Induction of Labor**

There is a mistake on this slide. What is it?
Induction of Labor

To achieve a vaginal delivery by stimulating the onset of uterine contractions before the spontaneous onset of labor at 39 weeks or beyond unless fetal lung maturity has been determined.

Induction of Labor - Indications

- Choriamnionitis
- Fetal demise
- Hypertension
- Preeclampsia/eclampsia
- PROM
- Post-dates
- IUGR

Induction of Labor - Contraindications

- Vasaprevia
- Placenta previa
- Transverse lie
- Umbilical cord prolapse
- Prior uterine surgery above lower uterine segment
- Active herpes infection

Induction of Labor - Methods

- Mechanical
  - foley bulb
  - laminaria
- Amniotomy
- Oxytocin
- PGE1 analogue
  - misoprostol (cytotex)
- PGE2
  - dinoprostone (cervidil)

Induction of Labor - Risks

- Uterine rupture
- Increased risk of cesarean delivery
- Uterine hyperstimulation
  - Fetal distress
- Increased costs
  - Length of stay
  - Rx, staffing, etc

Vaginal Delivery
When referring to the undelivered fetus one must consider the fetal:

LIE
PRESENTATION
POSITION

The fetal lie is the relation of the fetus to the long axis of the mother. It is either longitudinal or transverse. 99% are longitudinal.

Fetal Presentation

- Cephalic
  - Vertex or occiput
  - Face
  - Brow
- Breech
  - Frank: thighs flexed, legs extended
  - Complete: thighs flexed, legs flexed
  - Footling or incomplete: one or both feet or knees are lowermost

Fetal Position

The presenting position of the fetal occiput is named in respect to the maternal pelvis, i.e., LOA or Left (maternal pelvis) Occiput (fetal) Anterior (maternal pelvis).

Presentations at Term

- Vertex – 96%
- Breech – 3.5%
- Face – 0.3%
- Shoulder – 0.4%
- LOA – 2/3
- ROA – 1/3
Vaginal deliveries

- SVD – spontaneous vaginal delivery
- Assisted vaginal delivery – use of forceps or vacuum assisted
- Breech vaginal delivery

During the active phase of labor the fetus will usually progress through 7 cardinal movements prior to a vaginal delivery.

Cardinal Movements

- Engagement
- Descent
- Flexion
- Internal rotation
- Extension
- External rotation
- Expulsion

1. Head floating, before engagement
2. Engagement; descent, flexion
3. Further descent, internal rotation

Engagement

Descent
4. Complete rotation, beginning extension
Flexion
Internal Rotation

5. Complete extension
Extension

6. Restitution (external rotation)
External Rotation

7. Delivery of anterior shoulder
Expulsion

8. Delivery of posterior shoulder
Expulsion

Operative Obstetrics
Assisted Vaginal Delivery
Cesarean Delivery
Currently 1 out of every 10 American women delivered each year in the US has had a previous cesarean delivery.

Ventura and associates, 2000

The c/s rate in 1965 was 4.5%. In 1988 it was almost 25%. In 2005 it was nearly 30%.

Indications for C/S

• Maternal indications
  – Abnormal labor
  – Hemorrhage
  – Contracted pelvis
  – Prior C/S (>2)
• Fetal indications
  – Abnormal presentation
  – Fetal distress
  – Multiple gestation
  – Fetal macrosomia

A classical C/S is one in which the uterine incision is vertical.

A LTSC/S is one in which the uterine incision is transverse.

The skin incision has nothing to do with the underlying uterine incision.

A classical C/S can follow a Pfannenstiel incision.

Likewise, a LTSC/S can follow a midline skin incision.
Assisted Vaginal Delivery

Forceps

Vacuum

Prerequisites Prior to AVD

• Head must be engaged
• Vertex presentation
• Position must be known
• Cervix fully dilated
• Ruptured membranes
• No CPD

AVD

• Mid forceps - 0 to + 2 cm
  – with or without rotation
• Low forceps - ≥ + 2 cm
  – with or without rotation
• Outlet - scalp is visible at introitus

Indications for AVD

• Prolonged second stage of labor
• Suspicion of immediate fetal compromise
• Shortening the second stage of labor for maternal benefit

VBAC

Vaginal Birth After Cesarean

VBAC

• In 1995 27.5% of women with a prior C/S attempted a VBAC
• 60-80% of attempted VBACs are successful
• Risk of uterine rupture is 0.7%
Who Are Candidates?

- One prior LTSC/S
- Two prior LTSC/S and SVD
- Clinically adequate pelvis
- No other uterine scars
- Physician immediately available throughout active labor
- OR crew and Anesthesia available

ACOG Practice Bulletin #54, 2004

Common Obstetrical Disorders

- Hypertensive disorders
- Multiple gestation
- Rh isoimmunization
- IUGR
- Premature labor
- Gestational diabetes
- Group B Strep

Hypertensive Disorders of Pregnancy

- Chronic hypertension
  - bp >140/90 before 20 weeks
- Pregnancy-induced hypertension
  - bp >140/90 after 20 weeks
- Preeclampsia
  - proteinuria >300 mg/24hrs
  - Edema
  - bp >140/90

The natural incidence of twins is 1/80.

The incidence of triplets is 1/80² or 1/6400

The incidence of quads is 1/80³ or 1/512,000 …..

Monozygotic twins (identical or paternal) result from the splitting of a single fertilized ovum into two genetically identical embryos.

Dizygotic (fraternal) twins arise from the fertilization of two ova.
Risks Associated with Multiple Gestations

- Hyperemesis
- Abortion
- PIH
- Anemia
- Amniotic fluid disturbance
- Preterm labor
- Umbilical cord prolapse
- Discordant growth
- Operative delivery
- Fetal complications
  - Respiratory distress
  - Intracerebral bleed
  - Sepsis
  - Necrotizing enterocolitis
- Congenital malformations
- IUGR

Rh Isoimmunization

Maternal sensitization of erythrocyte antigens can occur resulting in hemolytic disease of the newborn.

More than 40 antigens can be involved.

Rh D Isoimmunization

- 10-fold decrease in incidence with use of RhoGAM (anti-D immune globulin)
- 300 ug IM at 28 weeks and post-delivery if baby is Rh (+)

Rh D Isoimmunization

- RhoGAM also to be administered after
  - AB
  - Ectopic
  - Injury
  - Invasive procedure
  - Fetal demise
  - External cephalic version
  - 2nd or 3rd trimester bleeding
IUGR
Intra-Uterine Growth Restriction

An EFW at or below the 10th percentile for that gestational age is consistent with IUGR and close scrutiny is warranted.

Serial estimations of fetal weights and NST should be performed. If there is no growth over a 2-4 week period, consideration of delivery would be prudent.

IUGR Increases Risk of:
- Stillbirth
- FHR abnormalities in labor
- Meconium passage and aspiration
- Polycythemia
- Hypothermia
- Thrombocytopenia

Etiology of IUGR
- Smoking
- Low pre-pregnancy weight
- Poor wt gain
- Age <16, >35
- Diabetes
- Chronic renal dx
- SLE
- Heart dx
- Sickle cell dx
- Hypertension
- Thrombophilia
- Rx
- Multiple gestation
- Anomalies
- Infections
  - Cytomegalovirus
  - Toxoplasmosis
  - Syphilis
- Placental

Premature Labor
Preterm labor is defined as regular contractions associated with cervical change before 37 weeks.

Approximately 10% of all deliveries are complicated by preterm delivery.

Risks Factors
- Smoking
- 2nd trimester bleeding
- Age <17 [RR]=1.75
- African-American [RR]=3.3
- Low pre-pregnancy wt
- History of prior preterm birth

Gestational Diabetes

Approximately 3% of all pregnancies are associated with gestational diabetes.

Screening consists of a 50 gm glucose load and a RBS 1 hour later. If the value is >140 mg/dL, a 3 hr GTT should follow.
## O'Sullivan Diagnostic Criteria

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<th>95*</th>
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<td>1 hour</td>
<td>190</td>
<td>180*</td>
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<td>2 hour</td>
<td>165</td>
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<td>3 hour</td>
<td>145</td>
<td>140*</td>
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GDM is diagnosed if 2 or more values are elevated

* New Criteria

## Group B Strep

GBS is found in the normal flora of 25% of all women.

A newborn carries a risk of 2.5% of acquiring a strep infection from a colonized mother. 6% are fatal.

All women should be screened at 35-37 weeks. If GBS is confirmed, antibiotics (penicillin) should be administered while in labor.

## Obstetrical Emergencies

- Shoulder dystocia
- Hemorrhage
  - Placental abruption
  - Placenta previa
  - Post-partum
- Embolus

Shoulder dystocia is the entrapment of the anterior shoulder beneath the maternal symphysis pubis.

Failure to deliver the baby can result in long-term neurological deficit or demise.
Obstetrical Hemorrhage

- Placental abruption
  - Premature separation of the placenta from the uterine wall
- Placenta previa
  - Implantation of the placenta over the os
- Post-partum hemorrhage
  - Uterine atony
  - Laceration

The leading cause of maternal mortality is embolic events from either a thrombus or amniotic fluid.