Please note that the above/attached/below is a compilation of notes taken from previous training commitments and do reflect guidelines or formal MFM recommendations. These are to be used for study purposes only. The Creasy MFM bd review is a review of Creasy as developed by different MFM fellows in studying for boards, please reference the text and updated versions of the text to confirm the information.

GENETICS-ESP KARYOTYPES
DIABETES-ESPECIALLY DIET
50-50% complex carbs-whole grain breads and legumes that release glucose slowly
20% protein
20% fat
35 cal/kg ideal body weight
THYROID STORM
• A beta-blocker to control the symptoms induced by increased adrenergic tone.
• A thionamide, such as methimazole, to block new hormone synthesis.
• An iodinated radiocontrast agent to inhibit the peripheral conversion of T4 to T3.
• An iodine solution to block the release of thyroid hormone.
• Glucocorticoids to reduce T4-to-T3 conversion and possibly treat the autoimmune process in Graves’ disease.
THORACIC ANEURYSM
COMMUNITY ACQUIRED PNEUMONIA
EHLLERS DANLOS
OPEN LAPAROSCOPY
IV IRON THERAPY-KNOW FORMULA
Iron is best absorbed as the ferrous (Fe2+) ion in a mildly acidic medium. As a result, we usually add a 250 mg ascorbic acid tablet at the time of iron administration to enhance the degree of iron absorption.
One calculates the iron deficit based upon the fact that 1 gm of hemoglobin contains 3.3 mg of elemental iron. Assume, for example, that a 60 kg woman with a hemoglobin concentration of 8 g/dL due to iron deficiency needs parenteral iron replacement.
• The normal blood volume is approximately 65 mL/kg. Thus, her total blood volume should be 3900 mL or 39 deciliters (65 mL/kg x 60 kg).
• A normal hemoglobin concentration would be 14 g/dL. Thus, her hemoglobin deficit is 6 g/dL with a total deficit of 234 g (6 g/dL x 39 dL).
• Each gram of hemoglobin contains 3.3 mg of iron. Thus, her total red cell iron deficit is 772 mg (234 g of hemoglobin x 3.3 mg Fe per gram).
The most generally available parenteral iron preparation in the United States is an iron-dextran complex which contains 50 mg/mL of iron in 2 mL vials. This patient's deficit of 772 mg would require eight 2 mL vials (800 mg iron) which is usually given intramuscularly into the buttocks with a Z track at a rate of one vial two to three times each week.

Intravenous iron — Patients who have very brisk continuing bleeding (as with gastrointestinal angiodysplasia) are difficult to treat with the above regimen because repeated courses of intramuscular iron are painful. Rare patients with severe malabsorption and/or malnutrition resulting in markedly reduced muscle mass may similarly not be candidates for intramuscular treatment. Intravenous iron can be tried in such patients. Data from Europe and the United States indicate that, in comparison with iron dextran, sodium ferric gluconate complex in sucrose has a reduced incidence of adverse allergic reactions (3.3 versus 8.7 allergic events per one million doses per year), including death (case fatality rate of zero versus 16 percent for allergic/anaphylactic events) [3]. Both products are available in the United States, although experience with the gluconate complex product is limited. (See "Iron balance in dialysis patients", section on Ferric gluconate complex).

For iron dextran, the entire dose is given intravenously, adding the eight vials (16 mL) of iron dextran to 500 mL of saline and administering this solution at a controlled rate in a setting in which anaphylaxis can be quickly detected and treated with subcutaneous epinephrine and intravenous diphenhydramine and methylprednisolone. One approach is to infuse
25 to 50 mL of the mixture over about five minutes, and then stop the infusion and observe the patient for one hour [4]. If there is no evidence of anaphylaxis, the remaining 450 mL is infused over two hours.

**AMNIOINFUSION**

**OPIATE WITHDRAWAL**

- **Mom**: Start methadone 1-20 mg, go up 5mg day
- **neonate**: CNS irritability-70%
- Cry
- Fever
- Hypoglycemia
- Poor feeding
- Vomiting/diarrhea
- Treatment-warm dry supportive environment, +/- phenobarb, valium

**ECHOCGENIC FOCUS**

**VENTRICULOMEGALY**

**CONG DIAPHRAGMATIC HERNIA**

1/2200 births
- 20% TRISOMY 18 OR 21
- Failure of closure of posterolateral pleuropitoneal folds during 8-9 weeks
- Intestine (90%), liver (50%) in thoracic cavity
- Hernias usually involve left hemidiaphragm
- Mortality 20-60%

**MULTIPLE SCLEROSIS**

**PYELECTASIS**

- Trisomy 18
- Rocker bottom feet
- Overlapping digits
- Micrognathia
- Heart disease-vsd, tetratology
- Oomphalocele
- CDH (10%)
- Ontd (20%)
- SUA
- Cystic hygroma

- Trisomy 13
- Holopros
- Enlarger cisterna magna (15%)
- Cyclopia
- Cystic hygroma (21%)
- Polydactyly
- Heart defects (espec HLHS and vsd)
- Cystic kids
- Oomphalocele

- Turners
- Cystic hygroma
- Heart disease-coarct(30%)
- Renal anomalies-horshe kidneys

- Trisomy 21
- Inc nuchal
- Heart disease (50%) endocardial cushion with extensive asd, vsd most common
- Duodenal atresia
- Short limbs
- Pyelectasisechogenic bowel
- Cpc
Sandal gap

Ultrasound Pearls
90% of hydrocephalus due to arnold-chiari
4% due to dandy walker
3-5% aqueductal stenosis
dandy walker-meckel gruber, walker-warburg, aicardi
meckel-gruber-cystic kids, encephalocele, polydactyly

Cardiac disease:
8% coarct
4%HLHS
6-10% tetrology
30% VSD
coaertation-turners, Digeorge, velocardialfacial
DORV tri 18 and te fistula
Pentalogy-ternal defect, absence of parietal pericardium, ectopia cordis, diaphrag hernia, ?oomphalocele
Pyelectasis->5mm less than 20 weeks

SAUNDERS start p101

GASTROCHISIS
• 1/4000-1/50,000
• RIGHT oophalomesenteric artery-umbilical cord arises medial to the defect
• Only 5% have other anomalies
• IUGR sometimes, but tough Dx because of small AC
• Should have fetal echo
• MSAFP elevated
• May deliver vaginally
• >90% survival
• bowel dilation > 1.8 cm associated with morbidity

Omphalocele
• 1/5000
• common herniation of liver
• assoc with T18, 13, Beckwith Weidemann

DANDY-WALKER
Poserior fosa cyst, defect in cerebellar vermis, hydrocephalus
• Meckel-Gruber-recessive, polycystic kidney, encephalocele
• Walker-Warburg
• Aicardia
• 15% association with T18, T21

Prognosis
• Mortality in 35%
• 33% have IQ below 80
• May have agenesis of corpus callosum
• Should do chromosomes
• Treat with shunt

CHARGE
as manifested by a coloboma of the optic nerve head, congenital heart defect (ASD, VSD, and parachute mitral valve), choanal atresia, severe growth retardation, genital hypoplasia, abnormal ears, cleft lip and palate, and pectus carinatum.

Coloboma Heart Anal Rectal Genital Ear

Worse during pregnancy(rare)
Condyloma
CHAPTER 1
Introns-not transcribed
Mutations:
Transitions: pyrimidine for pyr, pur for pur
Transversions: pyr for purine
Deletions
Insertions
Duplications
Inversions
Translocations-most common of above
Abortuses:
- 52% trisomy
- 18 % 45 X
- 17% triploid
- 3% unbalanced trans

Turner’s- 1/10,000 liveborn, but very common midtri (70% loss rate)
Klinefelter 47XXY (1/700-1000 liveborn)
- Tall, slim
- Cryptorchism
- 20% IQ below 80
Cleft lip 1.7/1000 in Caucasians
Cleft palate 1/2500
CF:1/2500 Caucasian
CHD 5-7/1000
ONTD 1.5-2.0 in US Ireland 7.8. 2-3% recurrence, 5% with 2 prev children
Imprinting-effect of which parent mutant gene comes from- Prader-Willi-paternal
Fragile X: X linked with variable penetrance
Probably most common cause of inherited mental retardation
Q27.3
1/1200 males, 1/2000 females
20% of males who have gene are normal
CGG repeats (?VNTRS)
Normal-6-24
52-200 carriers of permutations
Seems to be little or no change in repeat number during male meiosis and transmission to females HOWEVER, dramatic changes in number with female meiosis
Cell Cycle:
G1-RNA synthesis and protein
S-DNA replication
G2-DNA repair-prep for mitosis

CHAPTER 2
Tay Sachs: 1/31
Ashkenazi, Cajun, French Canadian
Alpha Thal:
One gene-carrier 30% of Afr Amer
Two genes-trait 3% Afr Amer
3 genes: Hb H (tetramer of B chains)
4 genes-Hb Barts (tet of Gamma-hydrops fetalis)
B thal
One gene-minor
Two genes-Major-Cooley’s anemia transfusion dependent

Risk of Aneuploidy:
35: 1/263, 1/110 ANY
40: 1/75, 1/43
45: 1/22, 1/15
Previous child with de novo chrom abnlty-1% recur risk
Parental Balanced rearrangement:
3-5% of all SAB pts
Risk of 2nd tri loss:
Recip trans-11%
(if diagnosed live born 20%, if from POC 3.4%)
Robertsonian (from mother) 15%

De NOVO translocation & risk of anomaly:
Reciprocal:6.1%
Robertsonian: 3.7%
Inversion: 9.4%
Marker Chrom: 11-15%
Triple screen:
60% detect with 5% FP rate
80% detect ONTD
90% Anen
5% FP rate
Mosaicism-HSU
Level 1-one cell 2.7 % of amnio
Level 2-one of three flasks-two cell lines-0.7 %
Level 3-two or more flasks with 2 cell lines-0.25%
Different terminology with CVS, but 1% risk
Risk of Loss with amnio & CVS
Tabor-RCT, 1986:
RR transplacental-2.5
Brown fluid 9.9

CHAPTER 3
Basic embryology
CHAPTER 4-Immunology
Innate-nonspecific-macrophages, NK cells
Adaptive-response to specific antigens T cells
T cells:
Th1-delayed hypersensitivity-IL-2, IFN, lymphotoxin
Th2- antibody protection and allergy-IL-4,5,6 and 10
IL-2 stims T cells, IL4,5 stims B cells
Fetal Innante Immnunity
Prior to 8 weeks-yolk sac
8-20 weeks-liver
20 weeks and beyond-marrow
fetus/neonate has fewer mature macrophages
only 10% OF FETAL LEUKOCYTES ARE GRANULOCYTES
Poorer response to cytokines
Complement 50% activity
Fetal Adaptive Immunity
IgM 10% of adult
IgA 1% of adult
IgG the same because it crosses the placenta BUT ACTIVELY TRANSPORTED, Mostly in 3rd trimester, so preemies have lower levels
T cell counts are similar to adult, but 50% cytotoxic activity
Trophoblast antigens:
Syncytio-no antigens
Extravillous cytotrop-some have Class I antigen-HLA-G

In endometrium and decidua
Large granular lymphocytes-largest number of wbc's in early decidua-then disappear while macrophages increase
Immmodystrophism-immune system inhibits invasion
Immnotrophism-GM-CSF, IL-3 promote growth and invasion

CHAPTER 5—ANATOMY

**Uterus**-capacity increases from 10-500ml
Increase in size fro first 6 weeks hyperplasia
Hypertrophy is reason after first trimester
‘figures of eight’ around vessels, fibers grow from 50 to 500 microns
Blood flow-unsure. Likely increase from 40ml to 500ml
- 5% to myometrium
- 10-15% endometrium
- 85% placental
  estradiol and estriol may increase flow and NO production

**Cervix**- 85% connective tissue
Endocervical mucosal proliferation 1/2 cervical mass in late pregnancy
Marked increase in cervical water content in late pregnancy

**Vagina**-increased glycogen, hypertrophic rugae

CHAPTER 6—Uterine Biology
Membrane potential ~40-50 mV
Na, Ca, and Cl higher outside cell
K higher inside cell
Six connexins form a gap junction
Connexin-42Kda protein
Estrogen inc gap junctions
Progesterone dec them
Calcium binds calmodulin
This complexes activates myosin light chain kinase
MLCK phosphorylates myosin(myosin makes up thick filaments)
Ca-calmodulin PHOSPHOYLATES MLCK, which inactivates it
L-VOCs (L voltage type calcium channels) are target of nifedipine and ritodrine
Phospholipase C releases IP3 and DAG
IP3 increases intracellular calcium
DAG activates protein kinase C
Oxotocin receptors increase from estrogen and decreased by P4
Prostaglandins increase intracellular Ca by inc ca from outside and inside cell
B-adrenergic drugs inc camp by activating adenylate cyclase
Camp activates protein kinase A which inhibits myosin light chain phosphorylation

CHAPTER 7—Puerperium
Within 1 weeks, uterus 1/2 size to 500g
By day 16-prolif endometrium restored
Cervix- 3 days-looks normal but 3 cm dilated, 1 week appears grossly normal
Cervix not fully normal until 3 months though histologically
Ovulation resumes average of 10 weeks nonnursing, 17 weeks nursing
70% will have menstruated by 12 weeks nonnursing
any menses in first 6 weeks is anovulatory
bHCG is eliminated in average of 14 days
37 days after first tri SAB
Cardiac output is still increased after 12 weeks, mostly due to inc in SV BUT also EDV and SVR still not normal either
CO dec 30% within 2 weeks

RenalGFR and CrCL nl by six weeks, but kidney length 1.5 cm or longer. R ureter may still remain after 6 weeks, and 10% will have at least some permanent long term dilation of ureter or bladder
Normal liver products within 3 weeks
Alk phosp elevated until 20 days

CHAPTER 8 - Lactation
15-25 mammary buds
alveolus-ductule-duct-lactiferous sinus-nipple pore
glandular acini-third month
acini mature in 3rd tri from hypertrophy
blood flow inc 400-500 times
estradiol and p4 necessary for breast growth
estrogen matures duct
p4 matures lobular-alveolar system
prolactin rises to 300 ng/ml, stays elevated fro 2 weeks, drop slightly but remains elevated for 3 mo in breastfeeding women and only slight increases while feeding
dopamine inhibits prolactin
if estrogen used to inhibit lactation, prolactin levels actually rise
induction of prolactin receptors inhibited by p4
prolactin induces formation of protein component of milk, as well as fat and IgA
role of hPL—undetectable 24 hrs after delivery-may act as insulin antagonist
it is thought rapid fall in estrogen and p4 initiates lactation
oxytocin and prolactin released in response to suckling
100% of women feeding anovulatory 3 mo postpartum
feeding associated with 6.5% dec in bone density in lumbar spine-likely resolves
colostrum
7.9% protein
1.3 fat
3.2 lactose
human milk
1.1 protein
4.5 fat
6.8 lactose
Cow-more protein, less fat, far less lactalbumin, more K+
Human milk isotonic mostly due to lactose, but high in K(55) low in sodium (15) cal (33)
Milk is basically fat emulsion
Mostly triglycerides
Production-550ml week 1, 800ml week 3, 1.5-2 l at peak
Need 500-1000 extra cals per day, but most don’t get that, burn fat instead
Feed on demand, 5 min each breast
0.5% infants hyperbili, NO known cases of kernicterus in healthy children
eyrtho, warfarin, labetalol, vaccines safe in pregnancy
prozac, flagyl, macrodantin not recommended

Chapter 9 - NUTRITION
10 lbs by 20 weeks, pound per thereafter
Underweight women and those with poor weight gains at risk for LBW
each kg weight gain=33g in fetus
if weight gain is AT LEAST adequate in 2nd tri-outcomes closer to normal
only 40% od women gain ideal weight
need extra 300 cal per day
need 500mg iron for maternal rbcs + 300mg for fetus
should supplement 3o mg day in 2nd and 3rd tri
1000mg per day calcium
vegan need b12, calcium riboflavin

CHAPTER 10 - TERATOLOGY
Benzos, phenothiazines, TCA-no pattern of malformations
Lithium-Ebstein's rare

SSRIs-? PTD
Est/Prog: probably not teratogen, P4 may increase hypospadias risk
DES-cleared cell and unknown rate of uterine malformations
ACE-2nd and 3rd tri-calvarium, decreased uterine blood flow
Antimicrobials:
tetracycline, stain deciduous teeth, not permanent if used beyond 4th month
sulfasalazine, sulfonamides, bactrim really OK
TB drugs OK(INH rifampin, ethambutol)
Steptomycin-8th nerve
Anticonvulsants:
fetal hydantoin syndrome: IUGR, mental retardation, hypertelorism, low set ears, short nose with flat bridge, digital and nail hypoplasia
trimethadione-as above, upslanting eyebrows, folded over ears
tegretol:craniofacial 11%, fingernail hypoplasia 26%, developmental delay 20%
barbiturates similar
reason-most anticonvulsants metabolized to epoxide hydrolase, which may be low in those predisposed to malformation
Warfarin-iugr, mental retardation, seizures, nose hypoplasia, stippling of axial skeleton and epiphyses of long bones
MTX-ossification of calvarium, sab
Bendectin-no limb defects
Acutane and vit a:ears, conotruncal Radiation-
no risk below 5 rads, probably none below 10
CXR 8 mrads
diab xray 289
pelvic xray 41
Hyperthermia: hot tub 2.8 RR onnd. Also-iugr, CNS, first and second branchial arch causing midface hypoplasia.

tegretol, craniofacial abnormalities
Craniofacial - microcephaly, short palpebral fissures, hypoplastic midface, absent philtrum, flat nose, thin vermilion border of lip
Heavy drinkers (more than /week) 33% risk of low birth weight
T-ACE tolerance, annoyed, cut down, eye opener
Smoking-surgeon general in 1980 attributed 20-40 of all low birth weight to smoking
Risks:
Sab
Pprom
PTD 1.4 RR
IUGR 250 GM ON AVERAGE
PREVIA
ABRUPTION  2.5 OR
30% of all SIDS may be due to smoking
caffeine-probably safe less than 300 mg day, otherwise inc risk of IUGR
Cocaine-metabolized by acetylcholinesterases

Risks

- Genitourinary
- Cardiovascular ANOMALIES
- CNS
  - Plus, LBW (OR2.74), abruption, and PTD, SIDS (OR 4.10)

Opiates:

- ? LBW
- ?PTD
  - controversy exist as to above because of difficulty in controlling for confounders such as smoking, STDs
  - NO clear association between opiates and anomalies, however 50-95% neonatal abstinece syndrome (tremors, inc tone, fever, hypoglycemia, resp problems

CHAPTER 12-DOMESTIC VIOLENCE

15 MILLION BATTERED PER YR

25%-45% of women who were battered before continue to be battered during pregnancy(for a small number of women, pregnancy is a protected time)

- head neck abdomen common sites
- inc risk of LBW and PTD
- pts with postpartum depression should be evaluated for DV
- physician’s responsibility is diagnosis and heping with escape plan
- national toll free hotline

CHAPTER 13-GEN PRINCIPLES OF SONOGRAPHY

80% of women scanned

safe level of radiation<100mW/cm2

1/1000 pulse-24hrs of scanning=84 secs of exposure

if a target was 8 cm from a 100mW source,since inver proprt to square, it would only get 1/64th the energy

RADIUS, 1993:randomized to scan or no scan

- Adverse perinatal outcome about 5% in each arm

Problems with study

- 58 percent of patients followed to about 18 weeks were not eligible or were excluded from study
- of all eligible pts, 26% not randomized
- of controls, 45% had scan anyway
- 89% not assigned to routine scan ultimately had one done
- detecting anomalies, cost of lifelong care, avoidance of operative delivery in severe anomalies not discussed

1.1% of exams at 15-20 weeks will be a previa, only 14% persistent to term

Postdates occurs in 9% of patients, but only in 3% when ultrasound dating is used

Mongelli, 1996 if ultrasound is done prior to 24 weeks, it is superior to LMP dating

Ultrasound accuracy:

- 6-12 weeks—3 days
- 12-20 weeks—1 week
- 20-32—1.5 weeks
- >32—2.5 weeks

dating (late)

- distal femoral epiphyses-32-35
- proximal tibial-34-37
- prox humeral 40 weeks

cephalic index=ap diameter divided by bpd. Should be .8

since fetal density varies , (from .833 mg/ml to 1.012) even if you know exact volume, you can have range of error of 20% or more(head =0.571 vs body =1.118)

IUGR=<10th %

In practice, IUGR only 5% of neonates. 80-85% are diagnosed by peds as constitutionally small and not at increased risk (PNM 1.9/1000)

ONLY SMALLEST 5% HAVE ANY INCREASED MORBIDITY OR MORTALITY

Macrosomia

60% due to LGA
40% diabetes
ultrasound only 75% sensitive in detect macro
anomalies: PNM 3.2 secondary to anomalies, accounting for 33%
IF, pts screened for fetal well-being (ie BPP) PNM for anomalies 83% of all deathsd
ventriculomegaly-diagnosis of exclusion, after ruling out dandy-walker or
arnold-chiari
ONTD-1/1000, 70% lumbar 20% sacral
CDH-now 80% survival, compared to 80% mortality, due to surgical
advances and ecmo
TE fistula likely if absent stomach and poly
dodonel atresi-30% down
large bowel obstruction rarely produces proximal dilatation
omphalocle-30% risk of abnl karyotype
pyelectasis-pelvis obstructed
hydronephrosis-calyceal dilatation
POLY:
67% idiopathic
13% anomalies
15% diabetes
PNM jumps from 10 to 50/1000 when single largest pocket is 2 cm or less
Multiples 1% of all pregnancies

CHAPTER 14-Structural Heart Dz
Congenital cardiac disease is most common lethal malformation
situs inversus totalis--heart and stomach both flipped
if heart and stomach on opposite sides-likey heterotaxy and complex
heart disease
RV pumps 55% of fetal blood
8/1000 cardiac disease, but only 4/1000 need surgery or medical therapy
and can be detected prenatally
fetal myocardium less compliant
4 ch view may be as high as 96% sesnitve in detcting heart disease
(Copel)
All fetuses with heart defect should be karyotyped--if this policy is
followed 28% will be abnormal Tri 18 and 21 mosot likely
even with vsd, incidence of aneuploidy 15%
microdeletion chrom 22-diGeorge, velocardiofacial and CATCH-22 (cardiac,
abnl facies, thymic, cleft palate, hypocalcemia)
if cardiomegaly, can have mass effect and pulmonary immaturity

CHAPTER 15-DOPPLER ASSESSMENT OF BLOOD FLOW
Better depth of penetration with lower frequencies
Arterioles contribute much of resistance
40% of combined ventricular output is to umbilical arteries
pulsatility: a/b/mean
resistance: a-a/a
higher s/d closer to fetal abdominal wall  RECORD IN THE MIDDLE OF CORD
it isn’t until 50% of secondary vessel branches are obliterated does s/d change
absent end diatolic-85% low birth weight and 5-10% risk of anomalies
karsdorpp-lancet- absent 14% IUFD, reversed 24%
Doppler may reduce odds ratio of death to 38%
Doppler not useful in postdates
LV flow goes to head while RV flow goes to body and placenta

CHAPTER 16-FETAL BREATHING AND BODY MOVEMENTS
BREATHING:
Breathing movements related to end tidal PCO2, increasing in exper
ements where 2% and 4% carbon dioxide where inhaled. This suggests functional chemoreceptors. Increased O2 inhalation had no
effect on breathing
Only 8% of 30 min intervals contained no breathing
Glucose stimulates breathing
Breathing is decreased 10-10% of normal in 2-3 days that precede labor
Breathing not useful in predicting PTD, IAI
Fetal states:
1F- non-REM sleep
2F-analagous to REM sleep
4F-alert, waking

BODY MOVEMENTS
4% of fetuses will not move in 1/2 hour
NOT influenced by maternal glucose
99.8% of fetal movements > 3 sec are associated with accels (TIMOR)
85% of accels are associated with body movements
movement remains unchanged prior to labor

VAS:
Intrauterine low frequency background noise 85 db
VAS must be 95 to elicit response
Vas doesn’t work well below 32 weeks, although ear fully developed by 24 weeks
Fetus had dec breathing following VAS
Movements increase after VAS, but at term there may be a delay. Inc movements thought to be a change in fetal states from 1F to 4F

CHAPTER 17-FETAL CARDIOVASCULAR PHYSIOLOGY

crista dividens in RA, diverts oxygenated blood from posterior IVC to LA

CRISTA INTERVENIENS--also in RA--directs deoxy blood to tricuspid
in effect-RV perfuses lacenta and LV the rest

40% of cardiac output goes to placenta (100 ml/kg fetus)
at all length, active tension generated by fetal myocardium is less than
adult, and passive tension at rest is higher as well

fetal cardiac muscle has increased proportion of non-contractile
elements, such as nuclei

fetal heart functions near top of function curve
increase in heart rate results in only modest increase in output
tyrosine kinase and monoamine oxidase lower in fetus
central or carotid chemoreceptors cause hypertension and mild
tachycardia while aortic chemoreceptors cause hypertension and BRADY
(late decel)

sympathetic innervation of heart not complete until term while
cholinergic develops early
JG apparatus in fetus functions early
PGE1 and 2 constrict umbilical circulation

CHAPTER 18-PLACENTAL GAS EXCHANGE

oxygen uptake by uterus/placenta is greater than fetus (secondary to
placental O2 needs)
oxygen needs of fetus are 2.5 times greater at midgestation
placenta is likely a venous equilibrator (if arterial and venous blood
run in parallel)
they don't exactly equilibrate due to shunts, uneven perfusion, and
diffusing capacity (thickness and surface area)
O2 therapy may not work if mom is well oxygenated, because transer takes
place on high part of fetal oxygen curve. (an increase of 410 torr
results in fetal increase of 4 torr)

CHAPTER 19-FETAL HEART RATE

parasympathetic-medulla

atropine case inc of fhr 20 bpm at term
blocking vagus abolishes btbv
propanolol inc fHR 10 bpm
alpha adrenergic affects distribution of blood flow
aortic and carotid body chemoreceptors, as well as central chemoreceptors
in medulla
selective hypoxia or hypercapnia in chemoreceptors in adult produces
bradycardia
net result of hypoxia or hypercapnia in fetus in hypotension and
bradycardia
arch of aorta and carotid sinus has baroreceptors
Frank-Starling curve-inc preload, heart pumps with greater force (fetal
heart operates near top of the function curve)
extremes of fetal heart rate (<60 and > 240) are hazardous
umbilical flow 40% of cardiac output or 120 ml/kg
in fetal hypoxia, little change in CO but redistribution of flow to
heart, brain and adrenals
fetal oxygen consumption can dec to 60% of control
FHR Monitoring terms:
bseline approx mean fetal heart rate rounded to 5 bpm during a 10 min
segment. excludes periodic changes, areas of marked variability, and
must be readable for 2 of 10 min
below 110-brady
above 160 tachy
short term-R to R intervals
long term-occupy a cycle of less than 1 per minute
late- gradual (>30 sec) decrease in heart rate in which nadir occurs
after peak of contraction
early-gradual (>30 sec) dec in fHR in which nadir is conincident with
peak of contraction
variable-abrupt (<30 sec to nadir) dec in fHR that is at least 15 bpm
below baseline and lasts at least 15 sec but less than 2 min
prolonged-dec of at least 15 bpm, greater than 2 min but less than 10
min
accel-abrupt (<30 sec) rise in fHR. 15 sec but less than 2 min
pg 277
Blood from ductus venosus exhibits preferential streaming in IVC, into LA and out LV

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variable-abrupt (<30 sec to nadir) dec in fhr that is at least 15 bpm
below baseline and lasts at least 15 sec but less than 2 min
prolonged- dec of at least 15 bpm, greater than 2 min but less than 10 min
accel-abrupt (<30 sec) rise in fhr . 15 sec but less than 2 min
reflex lates and severe variables can be tolerated for at least 30 min
100-110 also well tolerated if good variability as is 80-100
FHR monitoring-have not shown consistent benefit and have shown an increase in c/s rate
mostly due to insufficient power to detect rare outcome of asphyxiial death
also, studies did not address how they defined tracing abnormalities or the time frame for delivery
meta-ANALYSIS (THACKER, 1995) 50% LESS SEIZURES IN MONITORED GROUP
auscultation-every 15 min in first stage and every 5 in second
ANTE-partum screening:
- reactive training-99% fetal survival for 1 week
- nonreactive-associated with poor fetal outcome in 20% of cases
false positive rate of CST is better, but is 50% compared to 80% for NST
CST: neg-no lates. pos-persistent lates. suspicious-occ lates
CHAPTER 20—FETAL ARRHYTHMIA
Of all arrhythmias, 88% are secondary to extrasystoles (since a very small number may go into SVT, weekly Fh checks recommended until it resolves)
Extrasystoles followed by SVT, complete heart block, then atrial flutter
45 of 69 patients with SVT were hydopic in 1 series
SVT: most common etiology is reentrant (can also be automatic (irritable focus) most commonly reentrant involves a Kent muscle bundle, such as in WPW.
(reentrant-sudden onset and sudden termination)
Aflutter-reentrant circuit is confined to atrium and does not involve AV node
Fetus needs diastole-if ventricular rate is slowed, the fact that atria contract against closed valves means still like to have hydrops
Aflutter-usually give dig first then type I agent like quinidine. If give quinidine alone-flutter rate slows, and is then carried through AV node so protect AV node first
Dig 1mg, then 0.25 tid keep 2 ng/ml, flec 100mg tid, keep .5 to 1 microgram per ml
(dig side effects-arrhythmias, n/v, fatigue, interacts with erythro, other drug)
(flec-CAST trial-high incidence of sudden death in post MI pts-used only for refractory patients)
prior to dig—check creatinine, lytes, EKG, to rule WPW
VTach-no dig. Pub with lidocaine, followed by maternal b-blocker
If second degree (Mobitz I or II) due to Rho or La, treat with dextrose
Complete heart block-50% risk of anomalies
Treatment of SVT:
1st line: dig
2nd line drug for svt-propranolol
flec 3rd line
amiodarone—4th line—wait 48 hrs after flec, half dig dose, monitoring for fetal hypothyroidism
atrial flutter—treatment same as SVT
VTACH—propranolol, lidocaine second line

CHAPTER 21—BIOPHYSICAL PROFILE
Sensitivity to hypoxia
- CNS center regulating NST
- Respiratory center
• tone and movement-least sensitive

unlike aortic and carotid chemoreceptors, CNS can reset itself at lower pO2-breathing may come back
in the absence of fetal hand movements, get 2 points for tone if closed fist

dec pH of 0.05 for absent:
• NST
• FBM
• FT
• FM in that order

BPP 8/10 and 10/10 never associated with pH < 7.23. (fetal death 0.6 per 1000, CP 0.4/1000, 0% academia)
48% of neonates acidemic with BPP 6 or less (also, score of 4 10% acidemia, score of 2 20%)
NST/AFI with similar results

CHAPTER 22-FETAL ACID BASE

\[
\begin{align*}
C_6H_{12}O_6 + 6O_2 & = 6CO_2 + 6H_2O \\
CO_2 +H_2O & \rightarrow H_2CO_3 \rightarrow H^+ + HCO_3
\end{align*}
\]

A gradient between fetal and maternal CO2 levels is necessary for CO2 to diffuse (CO2 dec fr from 39 to 31 mmHg)
Noncarbonic acids—nonsulfur amnino acoids become uric acid, incomplete combustion of carbs becomes lactic acid, inc combustion
of fat become betahydroxybutyrate
Noncarbonic acids are slow to diffuse across placenta

PH=pK + log Bicarb/Co2

Acidosis:
Metabolic: normal pCO2 and dec bicarb
Respiratory: increased pCO2 and NL bicarb
Mixed: increases Pco2 and dec bicarb
Respiratory acidosis—usually cord compression
Metabolic acidosis-may be maternal, then fetal
Increased anion gap-reduced excretion of organic acids such as renal failure, as well as alcoholic, diabetic, lactic acidosis
NL anion gap—renal tubular acidosis (bicarb loss) diarrheal states
With maternal metabolic acidosis, you see nl CO2 and low pH in fetus
50% of fetuses with no response to scalp stim of VAS will be acidotic—Clark, 1986
1% risk of scalp infection with Ph (ledger, 1978)

Cord gases-clamp cord within 20 secs, test blood within 1 hr
Cord gas below 7.00 and 1 minute APGAR less than 3 modestly correlates with seizure and need for intubation (Gilstrap, 1989)

For hypoxemia to be a proximate cause of neurologic injury (ACOG, 1996) need:
• PH<7.00
• Apgar 0-3 for longer than 5 min
• Seizures, coma, hypotonia
• Multiorgan failure

Leveno, 1991: pH < 7.00 , 8% risk of death, 9% risk of seizures

Lower pH increase incidence of meconium below the cords

CHAPTER 23-PUBS
RAPID KARYOTYPE 38%
Rh 23%
Infection
NIH
Check fetal with KHB, MCV
Complications:
1-2% serious
1-2% sample insufficient
5% failed procedure
overall 10% suboptimal rate
IMMEDIATE Complications
Any bradycardia-52%
Serious bradycardia-3%
Bleeding 50%
Serious bleeding 0.5%
Cord hematoma - rare
Failed procedure 5-9%
DELAYED Complications
Infection - <1%
(does not seem to inc rates of Hep B or C)
worsening alloimmunization - 1.8% per procedure

normal fetal values:
88% lymphs early on
hematocrit < 20 weeks is about 37, and goes up 3 points per trimester
lytes are similar, bili is much higher (up to 40, averages 18)
Rh isoimmunized and anterior unavoidable placenta - skip DOD and do pubs
amnio and PCR has replaced cordo for fetal blood type, but may not be reliable if bloody tap
**10% of nonanemic fetuses have DOD higher than expected, and 3% of anemic fetuses have DOD lower than expected***
Eosinophil count rises with transfusion
Bili > 80 requires transfusion, regardless of hematocrit
NAIT;
92% PLA-1 positive, 5% heterozygous PLA-1/PLA-2, 2.5% PLA-2 homozygous
treatment-high dose IVIG(1g/kg)—70% response
PUBS 24 weeks—check response---if poor response, add steroids and recheck 4 weeks later
FETAL INFECTION - wbc, H/H not useful. Total IgM may be useful as screening test—controversial
Agent specific IgM, or even superio, PCR is standard for fetal infection (amniotic fluid)
NIH:
Hematologic (Rhm thals) Twins, thoracic compression, infection, aneuploidy

CHAPTER 24-FETAL THERAPY
Fetal T-cells don’t appear until 14-16 wks
bladder taps for PUV or hrdo-Na <100, Cl<90, B@ micro<6
CCAM-hydrops due to compression, and dec venous return (type 1-macrocystic)
Sacral teratoma-most common fetal tumor (1/35,000)
CDH diagnosed before 24 weeks has about 50% mortality

CHAPTER 25-ENDOCRINOLOGY
CYTO AND SYNCTIO PRODUCE PETIDE HORMONES, synctio-steroids
HCG rescues corpus luteum
Prog 250 mg/day
Placenta gets estrogen from 16 alpha –OH DS
Placenatl sulfatase release sulfur, then aromatse makes estriol
90% of estrogens secreted into maternal compartment
pregnancies reach term without sulfatase, but cervical ripening doesn’t happen
prog maintains quite uterus by direct action on smooth muscle, also inhibits prostaglandins
estrogens inc phospholipids,adrenergic receptors, and prostaglandins
IGF-1 causes cellular proliferation, TGF and EGF induce differentiation
HPL (hCS) similar to GH, causes:
• Insulin resistance
• Hyperinsulinemia
• Fasting hypoglycemia
• Increased lipids
• Decreased amino acids

Net effect: fetus is preferentially given glucose and mother amino acids
oxytocin receptors-inc dramatically in number before onset of labor
oxytocin increases deidual prostaglandin production
relaxin-nor necessary-made by corpus luteum and not gound in IVF
pregnancies
prolactin-tenfold increase likely due to estrogen causing threefold
increase in pituitary lactotrophs
(250 ng/ml fown to less thna 25)
decidua is main source of prolactin-not regulated by dopamine or TRH
role of prolactin may be water ans salt balance in amniotic fluid
CHAPTER 26 - MECONIUM

Gut-endoderm and mesoderm-day 14
Meconium-first evident in the fetal intestine 70-85
Large amounts of bile pigments from biliary tract give meconium color by 4th month
Cord-stains in 1 hrs
Fingernails-stain in 4-6
Vernix-12 hours
Mec has a VARIABLE effect on L/S
Sono has only 10% PPV for mec
Defecation-parasympathetic
Meconium seldom passed before 34 weeks
Gut transit time increases with advancing gestation
VERY CONFLICTING data regarding an association with hypoxia or low pH with meconium
Discolored fluid is noted in 2% of genetic amnios, but most often due to blood
Zorn-1986-9% SAB rate for discolored fluid
Third trimester passage of mec-2-11%
Intrapartum mec-7-22%
THE RELATIONSHIP BETWEEN MECONIUM AND LOW APGARS OR ACIDOSIS REMAINS UNCLEAR
THICKNESS OF MEC Doesn’t CORRELATE WITH APGARS
Miller suggests lower threshold for IFE and scalp pH

Mec Aspiration Syndrome:
- 2-8% of all patients with mec (although a third of patients with meconium have it below the cords)

MAS vicious circle: pulmonary vasoconstriction—right to left
shunting—hypoxia—more pul vasoconstriction
suctioning before the first breath gives no different outcomes—although
DeLee better than bulb
visualizing cords does not seem to be of any added benefit (Cunningham)
and should be reserved only for depressed infants/ AAPed DOES suggest routine visualization
oligo may play a role in MAS-8 times more likely with postdates, while
mec staining itself only twice as likely
MAS more common with abnl FHR (12% vs 2%) and thick mec (19% vs 5%)
amnioinfusion may dramatically dec mec below the cords, but no large enough studies to state that it dec MAS

CHAPTER 27 - FETAL LUNG DEVELOPMENT

Gluck-L/S
Liggins & Howe-steroids
Lung initially begins as a bud off the ventral esophagus

Pseuoglandular:
- 7-17 weeks
- progressive division of airways
- by 16 weeks 15 generations-to respiratory bronchioles
- vasculature begins to develop

Canalicular:
- 16-25 weeks
- birth of acinus
- epithelial differentiation
- potential blood air barrier
- recognizable type II cells

Terminal sac:
- 25 weeks to term
- progressive alveolarization increasing from 150 million
lungs are filled with fluid from canalicular period until delivery
fetus makes 4 ml/kg lung fluid per hour(high Cl content, low pH).
surfactant:
70-80% phospholipid
10% protein
10% neutral lipd
saturated phosphatidylcholine 80% of phospholipid-and is principal surface active component
phosphatidylcholine=lecithin
PG and PI have same precursor--as PG increases, PI falls
SP-A, pst abundant surface protein-probably host defense opsonin (absence does NOT cause RDS)
SP-B&C: 2-4 % surfactnt mass
30% of term infants with unexplained RDS are missing SP-B
infants catabolize surfact and recycle---preterm neonates dont do this well
surfactant dec opening pressure from 25 to about 15 cm H20, and prevents lung from collapsing at lower pressures
50% of neonates born at 30 weeks have RDS, though most have immature L/S
insulin ,TGF-B, and androgens slow maturity
**steroids work by increasing gas exhange surface area and influence lung structural protein---faster maturity may be at expense of growth**
steroids dec RDS by 50%, death by 30%
treatment to delivery interval less than 24 hrs may not effect risk of RDS, but dec death

L/S:
.5 --20 weeks
1.0 --32 weeks
2.0--35 weeks
L/S predicts development of RDS (*NOT* absence of disease)
2.0-low risk
1.5-2.0-modest
less than 1 high incidence
blood makes interpretation difficult because acetone extraction is made unreliable
PG-35 weeks-only present in the lung, so less affected by contamination with blood, mec
TDx-change in fluorescence depolarization--can still be used with blood
exosurf--phopholipids only
survanta- phospholipds plus Sp- B&C
above dec mortality by 30%
neonates that have gotten steroids respond better to surfactant admin

CHAPTER 28-RAB
Three or more losses-0.3% of women
24% loss rate after 2 losses
30% after 3
40% after 4
Genetic reason:45%
2 Trisomies, 45 X
3 3-6% of parents also have abnl karyotype-translocation most common
4 Roberstownian-simple math would predict 50% risk, but actually about 10%
Anatomic reasons: 10%
• Only type V abnormalities (septum)
• Not bicornuate or didelphys
Endocrine: 15%
• Luteal phase
• Thyroid (anti-tipo antibodies)
Infectious: about 10%
• Urealplasma
• Toxo
Immunologic::??
• Alloimmunity: ? Th1 (il-2 TNF) >>Th2 Th1 limits troph invasion
• Blocking antibodies invalid
alcohol> 2 drinks, caffeine > 300mg inc loss rates
if first preg loss was normal, next loss will be normal
Workup:
• Karyoptye
• Hysteroscopy. Laparoscopy, sonohyst
• Endometrial biopsy (for LPD—should be within 3 days) or midluteal < 10
• TFTs, prolactin
• ?torch
• ACA/LAC
• No LAD-blocking antibodies not usually present until 28 wks anyway

RAB pts at inc risk for ectopic and complete moles
95% delivery rate with FH in normals, 77% in RAB pts.
Fetuses with FH below 110 at 8 weeks were lost
Sac bigger than 15 mm or embryo> 5 mm without FG=loss
Kutteh, 1997- 4 ro 167 women would need to be treated with paternal leuks to achieve one additional live birth

CHAPTER 29-Cervical Incompetence
MRC/RCOG study—few births before 33 wks in cerclage group
Cerv length-50th percentile=3.5, 10th=2.5, 90th=4.5
T-Y-V-U
If cervix 50% funneled and length < 2.5-consistent association with PTD
RR of PTD 6.2 with 2.6 cm
RR of PRD 9.5 with 2.2 cm

Cervix is primarily fibrous tissue with only 10-15% muscle (more muscle in upper third than lower third)
Risk factors:
Cone
?relaxin
cervical dilatation is a final common pathway
85% chance of term birth after one loss (no treatment) 70% chance after 2
increased fever, prostaglandins following cerclage
may be increased chorioamnionitis, PPROM in cerclage beyond 20 weeks
inc risk of c/s for cervical factors, inc risk of laceration
Mann-isthmic cerclage—transvaginally
Transabdominally-short cx and failed prev cerclage
Success-75-85% for Shirodkar
73-89% for McDonald.
All studies limited by using previous pregnancies as control

CHAPTER 30-IMMUNOLOGIC DISORDERS
Primary APS-APS with no other recognizable disorder
Secondary APS-patients who have an underlying autoimmune disease
Diagnosis-need one clinical and laboratory
Clinical:
RAB
Unexplained fetal death
VTE
Arterial thrombus
Hemolytic anemia
LAC-causes in vitro anticoagulation because it binds antiphospholipids which are used to activate the coag cascade
Tests for ACA should be repeated several weeks apart
Beta-2-GP-1 may be the epitope for ACA

Medical complications:
• 5-12% risk of thrombosis during pregnancy
• 2% of VTE patients have APAs
• 5% of stroke patients have APAs
• APA pts have 25% risk of recurrence of thrombosis per year

OB complications:
• LA pts have 80% fetal loss rate
• 5-15% pts of APS pts have RAB
• 25% risk of early severe preeclampsia
• 30% IUGR
• 50% NRFHRT
25% PTD (iatrogenic)
Cowchock and Silver both found inc in PPROM with steroids and ASA, as well as inc in PTD
Women treated with heparin and asa still at some risk for OB complications
Women with thrombosis should get lifetime therapy
ITP in pregnancy:
Differentail:
PIH
Lab error
SLE
APS
HIV
Drug induced

Gestational thrombocytopenia occurs in 5% of pregnancies and is responsible for 70% of low platelets
Maternal platelet counts above 50K do not require treatment
Treatment:
Prednisone 1-2 mg/kg:improves within 3-7 days. Increase in plts occur in 70% of patients
IVIG:400mg/kg for 2-5 days. Works within 7-9 days and helps in 80% of pts. Should only be used in those who fail steroids.
Platelet transfusion-life threatening hemorrhage, preop
Splenectomy-also last resort, works 50%
Risk of ICH in ITP less than 1%---no scalp platelets, no cordo.
NAIT: 1 IN 1000-2000 BIRTHS
HPA-1=PLA1=Zwa
HPA1 more frequesnt than HPA2
97% of all Caucasians are PLA1 , 69% homozygous 28% heterozygous
although 1/40 pregnancies are incompatible, NAIT occurs in only 5 percent-antibodies titers may not be strong enough to cause disease
10% of NAIT neonates have ICH
NAIT can occur in a first pregnancy
Work up:
Zygosity testing of parents
Platelet typing with cvs or amnio
Recurrence extremely high
50% of affected neonates will have platelets below 20K
92% PLA-1 positive, 5% heterozygous PLA-1/PLA-2, 2.5% PLA-2 homozygous
treatment-high dose IVIG(1g/kg)—70% response
PUBS 24 weeks—check response—if poor response, add steroids and recheck 4 weeks later
Always give 5-15 ml maternal plateletapheresed platelets after PUBS

CHAPTER 31-PARTURITION
Uterine phases:
Phase 0: Quiescence--p4, relaxin, NO
Phase 1: Activation--uterotrophins,;estrogen, inc gap junctions
Phase 2: Stimulation—uterotonsins: prostaglandins,Oxytocin
Phase 3: Involution—oxytocin
Primate fetus: adrenal has fetal zone, adult zone, transitional
Cortisol mad ein adult zone, fetla zone makes estrogen precursors
Cortisol stimulates placental CRH and prostaglandin synthesis
Prostaglandins:
Membranephospholiids---Phospholipase C or A2-----arachidonic acid----PGHS 1 or 2(prostag H synthase)----prostaglandins
NSAIDS work on cyclooxygenase activity of PGHS
Amnion synthesizes prostaglandins, which are metabolized by PGDH in the chorion
Glucocorticoids incr eases PGHS and dec PGDH
B-mimetics-inc camp, but don’t work long term because receptors become downregulated and these drugs also promote prostaglandin production
PGDH is lowest in PTL with infection, intermediate in idiopathic PTL, and highest in pregnancy at term
PGDH stimulated by P4 but dec by cortisol
Placental CRH is inhibited by progesterone and increased by steroids
Rising cortisol levels at term may compete with progesterone for glucocorticoid receptor binding---this would block progesterone from inhibiting CRH
Oxytocin receptors increase calcium entry and IP3

CHAPTER 32-PTL AND PTD
Defined as less than 37 weeks
Spontaneous vs. indicated
11% Caucasian
19% African-American
83% of neonatal morbidity secondary to PTB

66% of neonatal deaths associated with birth <29 weeks
male mortality 2x female
twins 3-4X mortality compared to singleton
1986 data---
23-25 weeks 25%
27-28 weeks 3%
36 weeks .1%

Indicated PTB:
43% PIH
26% fetal distress
10% IUGR
7% abruptio
Spontaneous (75% of all) Risk factors:
Multiples
2nd tri bleeding
previous PTB

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<th>Second birth</th>
<th>Subsequent</th>
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<td>Preterm</td>
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Etiology of Spontaneous PTB:

Infection-
BV-preterm prediction study-OR 1.85
Positive amniotic fluid cultures in 20-30% of PTL (Romero, 1989)
AA women may be more predisposed to BV

Bleeding:
Ekwo, 1992-RR 15.1 2nd tri bleeding and pprom, 19.7 ptl
Uterine cervical factors
Uterine anomalies-29% SAB rate
Bicornuate 66% PTD
Multiples
8.8% of twins born before 32 weeks
32% before 35 weeks
54% before 37 weeks
22% of twin PTD were indicated, and accounted for 2.6% of births and 12% of ALL PTD, as well as 15% of all deaths
ART
--an independent risk factor for PTD even when controlling for other variables
Prediction of PTD:
Risk scoring: sens 40-60%, PPV 15-30%
FFN—
  Symptomatic-sens 90%, PPV 40%, NPV 94%
  Asympt—sens 30%
Cervical length less than 20 mm 25% PPV of del < 35 weeks
HOWEVER, a woman with previous PTB, pos fFN, and cx <2.5 has 65% chance of del prior to 35 weeks ( Iams, Preterm prediction study, AJOG, 1998)
Therapy:
Bed rest-no benefit
Antibiotics-no
Coitus-no
P4- possibly
Intervention/education—up to 50% reduction, but effect is seen much greater in higher income compared to low income women
HUAM-no benefit—daily nurse contact resulted in more intervention
Amniotic fluid cultures positive in PTL in up to 24% of pts (Gibbs)
Glucose < 14 has 87% sensitivity, 63% PPV, 98% NPV (Romero, 1990)
Pharmacologic Tx:
Beta agonists- excreted unaltered by kidney
  May delay delivery by up to 72 hrs
  Inc PCWP due to sodium retention
  Increase glycosgenolysis
  Hypokalemia
  ? inc in cardiac necrosis, pyloric stenosis
  0.3-5% cardiovascular complications
  pulmonary edema most common serious side effect
  50% of cases of edema happen in twins
  also associated with tachtcardia > 130 and Hb < 9
  betamimetics stimulate renin system and dec COP by 20% within 24 hrs
Mag Sulfate:
  ? mechanism of action, likely as calcium antagonist and dec acetylcholine at motor end plate
  myometrium inhibited at 5-8 mg/dl, DTRs disappear at 14
  oral mag not effective
  IV as effective as beta agonists
  Maternal side effects such as flushing in 45% of pts
  Osteoporosis if used more than 60 days
  At plasma levels 6-8mgm 50 % of fetuses will have NR NST and 20% no breathing
Indomethacin: (peaks in 1-2 hrs)
  Reversible affect on cyclooxygenase—effect gone as soon as blood levels normalize
  Antagonizes prostaglandins-which increase gap junction and intracellular calcium
  Avoid use is pts with asthma, bleeding disorders, renal or hepatic disease
  About half of neonates less than 32 weeks will have some ductal constriction after 24 hrs
  Calcium channel blockers: peak in 30-60 min

CHAPTER 33- POST-TERM PREGNANCY
Def=42 0/7 wks
frequency reported as 4-14%, with 2-7& going to 43 weeks.
chance of delivering exactly on EDC=5%
However, when ultrasound is used to date pregnancy,frequency decreases from 7.5% to 2.6%
mortality doubles at 43 weeks, 6X at 44
etiology: ?? fetal brain, pituitary, a drenal etc etc
Bochner-1987, 24 fold inc in C/S when maximum vertical pocket less than 3 cm.
Meconium present in 37% of post-term with normal fluid but 71% in those with oligo
Postmature syndrome: wasting of subcutaneous tissue, meconium staining, peeling skin: 10-20% incidence
Macrosmia is actually much more common than postmature syndrome 2X more likely to have a baby > 4000g
ACOG-data unclear if surveillance is necessary prior to 42 weeks, and if it is done, how often
AFI less than 5 associated with abnl FH tracings and mec, but no other adverse outcome
Dyson-routine induction at 41 weeks had a c/s rate of 14.5% compared to 27% in those allowed to progress
NICHD-1994 found no benefit of such a strategy
Summary-induce if cx is favorable after 41 weeks
few if any long term consequences of dysmaturity-however, if less than 2500g, high rates of neonatal death

CHAPTER 34-NORMAL AND ABNORMAL LABOR
Cervical coefficient: when you multiply effacement by dilatation, you get a similar number in nullip and primip (primips efface first)

Nullip:
latent 6.4 hrs (abnl > 20 hrs)
active 4.5
2nd stage 1.1 hrs
total 11 hrs +/- 8.7

Multip:
latent 4.5 hrs (abnl > 14 hrs)
active 2.5 hrs
2nd stage 30 min
total 7.2 +/- 7.2 (wide differences)
abnl latent phase associated with inc c/s, low apgars
protraction disorder=1.2 cm or lesss per hour in nullip, 1.5 cm in multip
arrest disorder: no dilatation or descent for 2 hrs (50% are caused by CPD)
pelvis:
gynecoid: round subpubic arch, amplies space between ischial tuberosities
android: narrow subpubic arch, straight rami, convergent sidewalls, prominent spines
anthropoid: narrow subpubic arch, straight sidewalls (assoc w/ OP)
platypelloid: wide subpubic arch
active mgmt: painful contraction plus either 100% effaced or ruptured membranes
amniotomy on admission
high dose pit (start at 4 and go up by 6) If no progress of at least 2 cm in 2 hrs

Frisoletto--no dec in c/s rates from active mgmt, but dec in length of labor and maternal infection
Cohen(1977) length of second stage has no relationship to outcome
Mueller-Hillis: fundal pressure with one hand in the vagina--if descent 1 cm or more-good prognosis for NSVD
shoulder dystocia
0.2-2% of all deliveries
40-50% of cases are when weight is BELOW 4000g
50% of cases have NO risk factors
transient brachial plexus injury occurs in 10-20% of all shoulders and 80-90% compleletely resolve
Based on birth weight
< 4000 0.1-1 5% non diabetic 0.6-3.7% diabetic
4000-4499 1.1-10% 4.9-23.1%
>4500 4.1-22.6 20-50%
greatest risk of hemorrhage is during the third stage
NSVD averages 600 ml hemorrhage
• atony
• lacerations
• coagulopaties
• accreta
• inversion
carboprost-withhold in asthmatics

Inversion:
- fundal placentation
- Huntington-laparotomy and grasping rounds
- Haultain-incision in posterior uterus

Induction:
- pit indextio associated with hyperbili
- if cervix is at least 2 cm and partially effaced, outcomes similar

Bishop Score:
Point system
Dilation 0-1, 2, 3-4, 5-6
Effacement 0-30, 40-50, 60-70, 80 0-3
station -3, -2, -1 or 0, +1 or 2
Consistency
Position 0-2
breech-3%, but 7% at 34 wks and higher at lower gest age
version successful 65% of time, with 2-3% complication rate
transverse lie: 1/300
associated with prematurity and multiparity
Edwards(1969) admit unstable lie to hospital and induce at 38 weeks-8% perinatal death
Brow and Face: each 1/500
In brow-mentooccipital diameter is largest possible
vaginal delivery depends on conversion to face or vertex

C/S:
1800s--85% mortality
rate was less than 5% by 1960 and performed mainly for maternal indication such as previa
indications 1980: dystocia 30%, repeat 30%, breech 10-15%, distress 10-15%
ANY febrile morbidity rate with prophylactic antibiotics is 10%
increase rate of TTN in elective c/s
OR of 2.1 fpr perinatal death-vbac vs. elective c/s
Review by Duff-26 studies showed a benefit of prophylactic antibiotics in reducing febrile morbidity and endomyometritis in c/s on LABORING pts (ok to give drug after cord clamp-just as effective)

Few pts need addiyional drug changes if given something active against anaerobes fro endomyometritis
0.7% maternal mortality with C-hyst, 3% bladder injury
fever occurs in 30% of laboring pts 4-5 hrs following epidural

CHAPTER 35-IUGR

WHO- <2500g=low birth weight

AGA
SGA-term
SGA-preterm
Nomograms were done in Denver-may underestimate weight (2.8-7.1 iugr rate)
Main causes are maternal vascular disease and smoking, plus genetic influence of especially maternal genes
Fetus grows 5 gm/day at 15 weeks, 10 gm at 20 weeks, 30 g at 32 weeks

About 1/3 infants born <2500g have IUGR
Infants between 15-2500g at term have a 5-30 RR of PNM

Etiology:

Genetic
10-30% incidence of minor or major anomalies in IUGR, accounting for about half of IUGR deaths
about 25% of IUGR fetuses (early onset) have chromosomal anomalies, 5% if later onset

Incidence of intraprtum distress is also about 50%

Birth weight has about 40% due to genetics and 60% due to environment (Polani, 1974)
Maternal contribution to weight determination more important than paternal

Anomalies:
SUA associated with 25% risk of IUGR
Infection: 5-10%
No bacteria known to cause IUGR
Of viruses, CMV and rubella most common
Multiple gestation 3%
Lag in growth attributed to dec in cell size
Twins birth weight similar to singletons after one year
Risk of IUGR in twins is 15-25%

Nutrition:
Winick reported three phases of fetal growth—hyperplasia, hyperplasia plus hypertrophy, and hypertrophy. Type of IUGR depends on timing (SYMMETRIC HAPPENS EARLIER)
Stein, 1975—Dutch famine study—birthweights declined by 10% and placental weights by 15%, only when below 1500 cal in 3rd trimester.
Dutch had only a 6 mo famine-preconception nutrition was good. Much greater differences observed in Leningrad, with dec over 400g
Zinc and folate levels correlate with IUGR
Altitude—mean birthweight of people living >10,000 ft above sea level 250 g less

Placenta:
As gestation advances, there is a greater increase in fetal weight than placental weight,
At a fetal/placental ratio of 10 or more, neonate more likely to be depressed
Terminal villi appear abnormal in IUGR fetuses, especially with abnl dopplers

Placental perfusion: 25-30%**
Clinical maternal vascular disease and presumed dec in uteroplacental perfusion account for about a third of IUGR
Maternal vascular disease may also be more likely to have symmetric IUGR
Smoking: 20-40% of low birth weight
Physical exam is even less reliable <2300g, only 40% of experienced Obs were within 450g
In general-intrinsic fetal insults result in symmetric, while extrinsic asymmetric
With normal BPP, PNM even with IUGR < 1/1000.
If score is 4 at last test—29% chance of IUGR
If score is 2 at last test—41% chance of IUGR
Adding Doppler to testing mix reduced PNM by 38%
Nicolaides, 1988—88% of absent EDF had some degree of acidosis
Commonly deliver before term in setting of maternal hypertension, pos FLM, or absent EDF

50% chance of lifelong complications in IUGR with Doppler

CHAPTER 36—MULTIPLE GESTATION

INCIDENCE—about 1%, but has risen to 1/43 for twins of late
Monozygotic twinning ‘remarkably constant’ at 3.5/1000 (**30% of all twins)
70% of twins dizygotic
30% Monozygotic
Of monozygotic twins—70% are Di/Mo, 30% Di/Di, 1% Mo/Mo
about 45% of twins will be dyzygotic and same sex—need further testing

Mortality:
Mo/Mo: 50%
Di/Mo 25%
Di/Di: 8%

Dizygotic twins always have dichorionic placentation
6-9 X incidence of velamentous insertion and vasa previa
Hellin’s hypothesis—if incidence of twins is n, incidence of triplets=n^2, quads n^3
Weinberg’s differential (for number of MZ twins): like sex pairs unlike sex pairs/number of pregnancies
rate of DZ twinning increases with advancing maternal age to 35, parity, conception in few months following delivery
Winn, 1982—membrane <2mm correlates with monozygosity 82% of time
CP in monozygotic twins after one dies is likely due to hypotension rather than thromboplastic agents
Higher risk of anomalies in MZ twins, most twins discordant for the anomaly

Determination of zygosity:
First-examine sex—if discordant—dizygotic
Next, examine placenta—if monochorionic, then monozygotic
? when you have dichorionic placentas—which can be either

1. check blood types—if parents have dissimilar types, so may twins
2. rilps
about 45% of twins will be dyzygotic and same sex—need further testing

### CHAPTER 37-MULTIPLE GESTATION, CLINICAL

<table>
<thead>
<tr>
<th>Complication</th>
<th>Twins</th>
<th>Triplets</th>
<th>Quads</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTL</td>
<td>40%</td>
<td>75%</td>
<td>98%</td>
</tr>
<tr>
<td>PPROM</td>
<td>18%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PIH</td>
<td>15%</td>
<td>40%</td>
<td>90%</td>
</tr>
<tr>
<td>GDM</td>
<td>7-10%</td>
<td>7-20%</td>
<td></td>
</tr>
<tr>
<td>IUGR</td>
<td>20%</td>
<td>?</td>
<td></td>
</tr>
<tr>
<td>Del &lt;24 wk</td>
<td>9%</td>
<td>20% (11% w/MFPR)</td>
<td></td>
</tr>
<tr>
<td>Del 24-28 week</td>
<td>4%</td>
<td>10% (8% w MFPR)</td>
<td></td>
</tr>
<tr>
<td>IUFD 2nd tri</td>
<td>3-5%</td>
<td>14-17%</td>
<td></td>
</tr>
<tr>
<td>Severe handicap</td>
<td>34/1000</td>
<td>57.5/1000</td>
<td></td>
</tr>
</tbody>
</table>

Selective reduction:
Pregnancy loss rate- 8% (from procedure)
24-28 28 wks- 4%
29-32 wks- 10%
32-36 wks 22%

MFPR: also 8% loss rate. If fetus reaches viability-90% chance of delivery beyond 32 weeks. However, loss rate directly related to starting number of fetuses

TTTS 5-15% of monochorionic twins
Expectant management near 100% mortality
Dec to about 25% with serial amnioreduction
Monoamniotic twins about 1% of all monochorionics
Peek, 1997—give sulindac to cause oligo and dec movement
OR daily NST from 26 wks on delivery at 34 weeks

Acardiac—also 1% of monochorionics

Conjoined—1/50,000. 75% thoracopagus, 20% pyopagus, 5% ischiopagus
IUFD of one twin (Di/Mo) 125 risk of encephalomalacia (likel due to profound hypotension)
Twins grow at same rate as singletons until 32 wks or so
Amnio justified at 31 in twins 28 wks in triplets
Loss rate with twins similar to singleton ((Ghidini)
4% of twin CVS specimens will be contaminated
cut off for ONTD 4.5 MoM: detection rate of 50-80% with 5% false pos rate
twins: =fFn at 28 wk =9X RR of PTD
    short cervix < 2.5 at 24 weeks= 7.7 RR

**in one series 9/15 larger twins had higher lung indices—if IUGR or other complications—tap both sacs**

VTX/VTX=45%
VTX/non VTX=30-40% (can del 2nd twin as breech SPONT 1500-3500g)
Breech=15%
CP:
CP 6X greater than singleton
2% of population but 10% of CP
twins—monochorionic and one dies in utero—survivor has 30% chance of PVL

### CHAPTER 38-PLACENTA PREVIA AND ABRUPTIO

Vaginal bleeding beyond 20 weeks complicates 6% of all pregnancies
- previa is the cause 7% of the time
- abruptio 13% of time
  - labor, lower genital tract lesions or unknown the other 80%

Previa: (0.5% risk)
Defines as either a placenta previa (covers os) or marginal previa (within 2 cm of os)
No longer use partial previa and low lying, because TVS has nailed the diagnosis down, and these terms, especially low lying, not consistently associated with increased morbidity

Timor, 1993: no increase in morbidity when placenta greater than 2 cm away
Risk factors:
- age
- multiparity
- AA or Asian
- Smoking, cocaine
- Prior previa
- Prior c/s

“low-lying” placenta may be diagnosed 45% of the time in 2nd tri, and resolves 90% of the time. However, 45% of these 90% may have problems such as IUGR, hemorrhage and abruptio.

Peak incidence of bleeding is at 30 weeks
False neg for transabdominal scan is 7%.
75% of previa may resolve by as late as 30 weeks
Maternal mortality has dropped from 25% to under 1% and PNM dropped from 60% to < 10%
Cotton, 1980—expectant mgmt—average gain of 17 days
Clark—accreta 25% when prev and one prev c/s, 50% with 2 or more
Inc risk of congenital anomalies with previa

Vasa previa
1/3000 deliveries
bleeding from tearing of vessels BUT, even without bleeding—50% loss rate from easy compression of these vessels

Abruptio:
Most often caused by rupture of a decidual vessel
1/120 deliveries
strong association with IUGR, likely helping to explain etiology
following trauma: observe for 6 hrs if no contractions, 24 hrs if there are
50% of abruptio severe enough to kill the fetus are associated with HTN

other risk factors: smoking, cocaine, age and high parity, pprom, prev c/s
recurrence risk:5-15%, if 2 previous abruptions—25%
attributable PNM to abruption is 2/1000
acute hemorrhage may be mistaken for a thick placenta—become hypoechoic in 1 week and sonolucent within 2 weeks
critical care-hemorrhage
must lose 25% of blood volume before unstable
urine output should be at least 0.5 ml/kg
give 3 X EBL as crystalloid
bedside coag test—whoe blood in red top should clot in less than 8 min
coag cascade-XII --XI--IX---PF3--VIII OR tissue factor plus factor VII
X+ V------prothrombin to thrombin
fibrinogen to fibrin

need 4 gm fibrinogen to raise plasma level 100 mg/dl
each bag of cryo contains 0.25 mg, so you need 15-20 to raise 100
placental chorangioma may cause hydrops
10% of mother will go into DIC
mother will only become unstable when 25% of blood volume is lost
50% of clotting factors must be consumed to bump PTT
FFP: 200 ml, all factors, inc fibrinogen 25 mg/dl
Cryo: 25-50 ml, factor 8 and 13, inc fibrinogen 15-25

CHAPTER 39-AMNIOTIC FLUID DYNAMICS

OUTPUT
Urine flow 800-1200
Lung fluid 340 (but half may be quickly swallowed again)
Swallowing 500-1000
Transmembranous 10
(across decidua into maternal circulation)
Intramembranous 200-500
(across placenta and vessels then back to fetus)

By term, total water accumulation is 4 L = 2899 fl s, 400 ml placenta, 800 ml amniotic
Amniotic fluid is maximal at 34 weeks and begins decreasing by 36 weeks
Solute actively transported into amniotic cavity, and water follows
While poor urine flow may be associated with oligi, poly is NOT associated with excessive urine production
Most fetal swallowing occurs with fetal breathing
Most lung fluid is immediately swallowed
Amniotic fluid osmolality decreases with advancing gestation (initially starts out as similar to blood, then becomes hypotonic)
Excluding fetal anomalies and diabetes, there is a good correlation between maternal plasma volume and AFV
Chamberlain (1984) if maximum vertical pocket less than 2 or greater than 8 inc PNM
Phelan (1987) AFI < 5, = NRFHRT, mec, and c/s. Current literature (Divon) not really a difference in outcome, though.
Oligo in 2nd tri has close to 90% PNM
POLY
1% of all pregnancies
66% idiopathic
13% anomalies (CNS, GI, thoracic)
8% IDDM
7% GDM
The higher the AFI the greater the risk of anomalies

<30 weeks more likely to be CNS, > 30 weeks more likely to be GI

CHAPTER 40-PROM
8-10% of patients at term present with ROM prior to labor
PPROM responsible for 30% of all PTD
Membranes subjected to stretching and MMPs near term
Latency:
>37 weeks—90% labor within 24 hrs
28-34 weeks—50% are in labor with 24 hrs and 90% with 1 week
<26 weeks—50% labor within 1 week
Chorio with PROM:
1% overall
3-15% with prolonged ROM
15-25% with PPROM
(up to 40% less than 24 weeks)
neonatal sepsis:
1/500 overall
3-5% with prolonged ROM
5% with PPROM
25% with PPROM and chorio
At term, rate of chorio increases with increased latency period BUT preterm, length of ROM does not increase rate of infection
(many preemies are probably infected by time of rupture)
infection may better correlate with time of first digital exam (Adoni, 1990)

Sepsis
1/500 overall
1/200 with prolonged ROM
3-5% with prolonged ROM AND c horio
5% with PPROM
15-20% with PPROM AND chorio

PPROM:
1.5% risk of cord prolapse
8.5% fetal distress
3.5% fetal deformation < 26 weeks
20-50% risk of pulmonary hypoplasia < 26 weeks
nitrazine turns blue at pH above 6.0, AF 7.1
reaccumulation occurs in 11%
PPROM may be associated independently with a dec risk of RDS, so steroids less dramatic effect
However, these studies done without antibiotics, and data suggest some benefit to 32 weeks
Common bacteria:
GBS-20%
BV—17%
Pepto-11%
Bacteroides-9%
Mercer, Lockwood, McGregor—antiniotics ma increase latency period 5-7 days
Also reduce sepsia, pneumonia, RDS, NEC, IVH
Romero—gram stain and glucose < 15 dx infection
Evaluation of FHR good screening tool for infection. Many fetus who were nonreactive were also lacking breathing
PPROM> 32 weeks (Garite) were able to obtain fluid in 50% and 50% were mature
Term PROM (Hannah, 1996) 5000 patinet.  Oxytocin group had less chorio and fever compared to PGE2, but higher c/s rate.
Oxytocin faster. Patients more satisfied with immediate induction
Nageotte—better APGARS and gases with prophylactic amnioinfusion
PPROM < 25 weeks—40% survival, but only 30% of these neurologically intact
32% risk of recurrence with PPROM, usually 2 weeks later

CHAPTER 41-INFECTIOUS DISORDERS

ASB:
Kass, 1960: defined as 100,000 CFU in absence of symptoms
6% of all patiens
40% went on to develop pyelo
Kass observed neonatal death rate and prematurity twice as high with ASB
Why: relaxed urinary tone, incomplete bladder emptying, uterine compression, higher urinary pH, glycosuria
ASB probably acquired prior to pregnancy:
1% in school girls
3.5% age 15-19 and goes up 1% per decade sexually active
E. coli, poteus, klebsiella, enterococcus most common
When ASB treated, risk of pyelo goes down to 2.9%
Treating ASB may prevent 10-20% of prematurity
RR of PTD=2.03 with ASB
Usually 7 day course of treatment, many antibiotics concentrated in urine
30% of E. Coli resistant to ampicillin

Cystitis:
Frequency, dysuria, but no systemic symptoms
Stamm suggests 100 colonies in symptomatic needs treatment
1.3 % of pregnant patients
17% will recur without tsuppression
don’t await culture results—Keflex 500qid good choice, or amox 500 tid

Pyelo:
1-2.5% of all pregnant patients
85% complain of back pain
40% dysuria
almost all have fever
2-8% of pyelo will develop respiratory complications due to endotoxin damage, risk factors:
5 heart rate above 110
6 tocolytic use
7 temp > 103
20% of patients will have transient renal dysfunction
may also have thrombocytopenia and hypotension
gent=3-5 mg/kg in 3 divided doses
most people respond with 48 hrs (85%)
recurrence risk 15%, but 2.7% if receive suppression

**IAI:**
0.5-10% of all pregnancies

**Cause:**
- Bacteroides 25%
- GBS 12%
- Other strep 13%
- E.Coli 10%

AF glucose > 20: only 2% of + culture, < 5 90% chance +
Intrapartum therapy cuts neonatal sepsis rate (0-3% down from 6-20%)
Women with IAI are more likely to have c/s
IAI id linked with periventricular leukomalacia and CP

**Postpartum Infection:**
- 3% of NSVD, 15-30% following c/s
- 7% of maternal deaths (4th leading cause)
- chorio 0.5 to 1%
- C/S: 15-50% infection risk, with 8-20% bacteremic, other serious complications(abscess, phlebitis 1%)

Risk factors:
- C/S
- Prolonged ROM
- Vaginal Exams
- IFE

Endometritis 15-80% following c/s and 1-4% following NSVD
Of all causes, C/S ids most important, and prophylactic antibiotics cut risk 50%
For post c/s endometritis, gent/clinda is superior but 15% failure rate
Continue antibiotics until patient is asymptomatic 36-48 hrs. NO oral therapy needed, unless proven bacteremia
If poor response—imaging study (abscess, hematoma, retained POC)
Septic pelvic thrombophlebitis—0-2%—at least 7 days of heparin
Septic shock—most likely to be caused by E. Coli

**Prophylactic antibiotics:**
Although infection rates cut 50%, 10-20% will still be febrile
Commence after cord clamp, 1 or 2 doses

**Mastitis:**
Staph common cause, but may be mixed infection if not occurring in hospital
2-3 weeks after delivery-culture breast milk
usually resolves 24-48 hrs

**C/S Wound Infection**
5% of C/S—rate may be increase if ruptured membranes > 6 hrs
infestation rate—
- 1-2% in clean wounds
- 10% in clean contaminated
- 20% in contaminated

C/s for emergency reasons inc rate 4 X
early onset—within 48 hrs WATERY drainage common
usually single pathogen-usually Group A strep of clostridium
drain and debride
late onset-6-8 days later—usually staph—PURULENT drainage
treat with I&D
antibiotics generally not required
**Episiotomy infection**
Early repair—one week after debridement
Necrotizing faciitis—may spread to abdomen, thigh or buttock, black or blue color

**GBS Infection:**
Group A strep used to be responsible for 75% of maternal mortality
Rate of GBS sepsis is 1.3/1000 newborns
Overall fatality rate of 4%, 2% in term, 16% in preterm
5-30% of women are colonized
75% of babies will be colonized if mother is
1% of infants of colonized mothers are septic

risk factors
- Prematurity
- Intrapartum fever
- Previous baby with GBS disease
- GBS bactiuria
77% of cases are early onset, 23% late
mostly manifest as bacteremia (80%, but also meningitis)
Early onset: usually first week of life, often within 48 hrs. Clinically appears as septic shock or RDS. 4.5% fatality

Late onset-more insidious. Only 2% fatality, but meningitis more likely, and half get sequelae
Treat with amp or pen
RISK factors- treats 18% of women and prevents 69% of disease
CULTURES treats 27% and prevents 86% of disease

**RODS**
Early onset disease-multiorgan involvement
Late onset-neurologic sequelae such as hydrocephalus
Has epidemic and endemic forms. Usually immunocompromised patients, but predilection for pregnancy
Treat with PCN and gent

**Lyme:**
*Borrelia burgdoferi*
Erythema chronicum migrans (60-80%)
Ecm is later followed by meningitis or Bell’s palsy and peripheral radiculopathies
5-10% of patients will have cardiac disease-AV block
late infection associated with arthritis
associated with poor pregnancy outcome—but no pattern of teratogenesis (rash, syndactaly, IUG)
may treat with amox 500 qid x 14-30 days
ceftriaxone 2gm IV daily for 14 days crosses blood brain barrier well

**Rubella:**
Fever, postauricular lymphadenopathy, rash
CRS: 50% first month, 10% third month
Cataracts, PDA, deafness
Diagnosis-rash is 14 days from exposure, IGM appears early and lasts for a few weeks
Avoid pregnancy 90- days after vaccine, but may breast feed

**CMV:**
A herpesvirus
Most common cause of intrauterine infection-0.5-2.5% of neonates (an additional 3-5Z5 get in in peripartum period)
5-10% will have neurologic sequelae
cmv not teratogen-sequelae due to inflammation
50% of higher income women susceptible compared to 15% of low income
infection may be reactivated
Primary infection is more likely to result in symptomatic CMV at birth, and much more likely to have sequelae
10% of neonates with congenital CMV are symptomatic at birth
90% of these will have neurologic sequelae
(microcephaly, PERIVENTRICULAR intracranial calcification, mental retardation, chorioretinitis)
may also have hepatosplenomegaly, deafness
90% of neonates born asymptomatic
10% of these will have late sequelae (hearing loss, abnl intelligence, behavior problems)
10% of women who are + shed virus during delivery, 50% chance fetus will acquire
diagnose by 4 fold rise in titer
widespread screening not done because of lack of effective therapy
can test amniotic fluid by PCR
must do serial testing—one test not proof of absence of infection
recurrence risk is unknown

Varicella:
90% have acquired by reproductive age, of those that ant recall, 90% will have had it
15 day incubation period
varicella pneumonia probaly no more frequent in pregnancy, but more fulminant (41% vs 11% mort)
congential varicella—RARE (<2%)—cutaneous cars, limb hypoplasia, rudimentary digits, ocular disease
risk is almost 0 with zoster
Infants born to mothers who develop varicella 5 days before to 2 days after delivery get VZIG

Herpes Simplex:
First episode primary-constitutional symptoms, lesions 2-3 weeks
First episode nonprimary—patient already has antibodies to some form of herpes, appears more like recurrent
Recurrent-lesions last 3-5 days, no fever or adenopathy
No increases in ptd
Primary—40% transmission, compared to 1-3% for recurrent
Infants with disseminated herpes have 50% risk of death
Treatment-acyclovir 200 5 x dai. Prophylactic-400 bid
1% of asymptomatic patients shed virus 1% of the time

Hep A:
Enterovirus—35% of all hep cases
Incubates 14-49 days
<1/1000 in pregnancy
gamma globulin can prevent 80-90% of disease

Hep B
45% of new hep cases
e GA postive uniformy transmit to children
1/1000 in US adults
10% of acute HBV result in persistnet infection, with 25% dying of cirrhosis or cancer
90% transmit if e +, 10% if e neg
HBig and vaccine within 12 hrs prevents 85-95% of disease

Hep D
Coinfection with B
25% of B patients
80% develop chronic liver disease and 25% die of hepatic failure

Hep C
RNA virus
Parenteral and sexual
20-40% of hep cases
50% progress to chronic disease
20% get cirrgosis in 5 years
higher perinatal transmission if HIV +

Parvo
Winter nad spring
Incubation 2 weeks
Erythema infectiosum
Adults more likely to have polyarthropathy, but rash is rare
50-75% of women immune
30% transmision rate, but overall only 5% risk of hydrops if mom gets it
start checking fetus 4-6 weeks after
transfusion controversial, but young (<20 week) fetuses may benefit more

**Influenza**
Pregnancy may predispose to pneumonia
Women should get vaccine

**Measles (rubeola)**
Rash 12-14 days after
Koplik’s spots on buccal mucosa

Bacterial pneumonia more likely in pregnancy
Increased rate of prematurity
Treat with ISG (immune serum globulin)

**Mumps**
Paramyxovirus
Meningitis, pancreatitis, parotiditis

**Coxsackie**
Group B myocarditis, meningitis

**Syphilis**
Incubate 10-90 days
Primary lesion disappears in 2-6 weeks
Secondary, or bacteremic stage lasts 2-6 weeks
Early latent —may again get lesions, bacteremia up to 4 yrs
Late latent—not infectious sexually
Tertiary develops in 33% of patients
Primary or secondary has 50% transmission, with 50% death rate
Early latent 40% transmission and 20% death rate
Late-10% transmission
Early signs—rash, hepatosplenomegaly, snuffles, chorioretinitis
Late-Hutchinson’s teeth, saber shins, saddle nose, cardiac
After treatment VDRL should become negligible in 12 months. Do titers every 3 months for 1 year
2.4 mill units benzathine X 1 for primary and secondary or latent < 1 yr, other wise repeat X 3

**Gonorrhea**
2nd most common STD
disseminated GC most common clinical presentation in pregnancy
(chills, fever, lesions)
amniotic infection syndrome-GC widespread in fetus—pprom
Thayer martin medium
10% of GC in US resistant to PCN
20-50% risk of coinfection with chlamydia
ceftaxone 125 mg or cefimine 400 mf po or 1 gm azithro

**HPV**
40% of reproductive age women carry

**Chlamydia**
Most common std
Reticulate bodies in cells—energy paprasite-don’t make ATP
Serotypes L1, L2, L3 cause lymphogranuloma venereum
A, B, C cause trachoma’
D-K cause std
60-70% transmission rate-50% get conjunctivitis, 20% get pneumonia
in top 3 pneumonia in infancy
? adverse pregnancy outcome
treat with erythro 500 mg 4 X day-prevents 90% of transmission

**BV**
1.5 RR PTD
flagyl 500mg 2 x day—80% cure
controversial in preventing PTD

**TOXO**
Oocysts found only in cats
Trophozoites are invasive forms—striated muscle and brain
Rare in US .1-1% of pregnancies
Fetal infection more common in 3rd tri compared to 1st (65% vs 17%)
First trimester has higher rates of severity (17% vs 5%)
Adults have flu-like symptoms, occasional ocular
Fetus gets intracranial calcifications, chorioretinitis and hydrocephaly
Look for pos IgM and four fold rise in IgG
Ultrasound finding: 74% ventriculomegaly, 32% increase placental thickness, 20% calcifications
May do PCR
Treat with spiramycin to prevent transmission
Sulfadiazine plus pyrimethamine for affected fetus—also supplement folate

**Trich**
Inc risk of LBW, PTD, and PPROM
May treat with single 2 gm dose of flagyl
Always avoid erythromycin

CHAPTER 42—HIV

150,000 WOMEN IN US WITH HIV
third leading cause of death among women 25-44
19% of all AIDS cases
RNA virus

AIDS cases include CD 4 <200, advanced cervical CA, pulmonary TB
Antibodies usually detectable within 1 month, almost always within 3
Mean time to develop Aids 11 years
ELISA—confirm with Western
Most reports have not found significant adverse pregnancy outcome
while it does appear that T cell function diminishes in normal pregnancy,
pregnancy doesn’t appear to alter the course of HIV, and vice versa
data seems to indicate most infection (60%) intrapartum (Sperling)
concern about later resistance in those patients treated with
monotherapy
in general, patients with viral load < 500 and CD4 counts above 500
would not get treated unless pregnant
if these cutoffs not met. then would treat with combination therapy
combination therapy:
Combivir = AZT + 3TC (300mg + lamivudine 150 mg) po BID PLUS
Indinavir (Crixivan) 800 mg po TID
Monotherapy:
ZDV-25% to 8% transmission rate
200mg 5 X day, then in labor 2mg/kg hr X 1 hr then 1 mg/kg thereafter
zdv associated with liver, lung and genitourinary tumors in mice
follow patients on zdv with cbc monthly and intermittent LFTs—only
frequent abnormality is anemia

CHAPTER 43—HEMOLYTIC DISEASE

DESCRIBED IN 1609, BUT CAUSE DISCOVERED IN 1940 BY LANDSTEINER AND WEINER
Fisher theory-Rh antigens inherited in 2 sets of three, cde…
45% of Rh+ individuals are homozygous for D, 55% heterozygous
zygosity testing—unless a man has fathered two children with different Rh status, can only tell Rh status by looking at certain combinations of antigens as a group (cDe vs Cde, etc)
Du sometimes replaces D
45% of gravidas will have evidence of transplacental hemorrhage by 3rd trimester, and 75% immediately postpartum
2.5% risk of TPH following ultrasound guided amnio
primary and secondary immune response. Primary is slow, and titers may rapidly rise following a secondary exposure
Indirect Coombs—take prepared RBC and suspend in serum from patient of interest. Wash RBCs several times and resuspend in anti-human globulin containing serum—rbc aggregate if sensitized
Rh- is 15-16% among Caucasians, but 35% in Basque region
Rh-4-8% in blacks
16% risk of isoinmunization following term pregnancy
2% risk if ABO incompatible
0.23% of women will have > 30 ml blood—RhoGam will not cover
2% risk of becoming immunized from 28 weeks on-account for 12% of all Rh patients
2% risk following SAB, 5% following D&E beyond 20 weeks
Severity of Hemolytic disease:
Mild:
   bili <20 mg/dl
   No anemia 50%
Mod:
   moderate anemia
   Severe jaundice (but in utero-metabolized by mat liver)
   Risk of kernicterus 30% treat after delivery
Severe
   < 34 weeks 12% treat in utero
   >34 weeks 12% deliver
indirect bili is lipophilic and carried by albumin—if levels outstrip albumin supply—toxic
direct bili is made by enzyme diglucoronide—water soluble and non toxic
hydrops likely do to extramedullary erythropoiesis and portal and umbilical venous obstruction
this also causes albumin production to diminish—decreasing oncotic pressure
if mother RH-, test father—if he is -, then just repeat titer at term
if mother Rh- and father Rh+, his ABO and ZYGOSITY testing should be done
(if he is heterozygote, there is a 50% chance baby will be Rh-)
following zygosity testing, retest titers at 20 weeks then 6 weeks thereafter—then direct Coombs of cord blood
amnio, c/s, and manual removal of placenta increase chances of sensitization
if previous fetus is hydropic—90% recurrence risk
Antibody titer predicts those at risk—not severity
In many labs, a titer of 1:16 predicts 10% risk of hydrops
Timing of procedures:
RH-, not sensitized: titers every 4-6 weeks
Rh-, sensitized: titers every 2 weeks
Rh-needs amnio: amnio every 1-4 weeks
Liley Zones:
Zone 1: mild disease, but 10% chance that will need exchange transfusion
Zone 2: moderate
Zone 3: severe-hydrops and death within 10 days
Straight to PUBS:
High titers
Prior history of hydrops
Equivocal DOD (mid zone 2) and higher
Anterior placenta
If placenta cant be avoided, PUBS is procedure of choice
Blood and meconium may obscure the peak at 450
If Zone 2 or higher > 34 weeks, deliver, if lungs immature—PUBS
Transfusion:
Use O-, CMV -, irradiated blood
For IPT, volume=(wks gest-20) X 10 ml. Take out some ascites first
If hydrotic fetus appears moribund (no breathing) then must do PUBS
Usual volume for PUBS is 50 ml/kg
Transfuse every 3 days until Hb is 18 and crit is 50
Retransfuse when it is expected that hb is down to 8 (goes down 1 pt in crit per day)
PUBS superior to IPT-88% vs 76% overall. Especially better with moribund (60% vs 0)
If patient has extremely severe early disease may consider supressing immune response with:
Plasma exchange transfusion
IVIG 1 gm/kg weekly
These are done only to temporarize until fetus large enough for access
RhoGam cant be given IV because anticomplementary
Adding 28 week dose decrease risk of sensitization from 1.8 to 1%
ABO incompatibility very very rare cause of need for plasma exchange. ABO antibodies are usually IgM, do not bind complement
Of atypical antibodies, most common is anti-E, Kell, and anti-c
Of these, c more likely to cause disease(65%) 80% of fathers are c positive 40% homozygous
DOD not as reliable with Kell, likely because it has greater effect on erythroid precursors
91% of fathers are Kell neg, so check them first
don’t abandon DOD with Kell, but much lower threshold for PUBS

CHAPTER 44-NONIMMUNE HYDROPS

87% of hydrops is now nonimmune
50-98% mortality
etiology unknown in > 50% if cases
Poly present in 50% of cases
hydrops: 2 or more of ascites, pleural effusion, pericardial effusion, skin edema(> 5mm)

placental thickening=> 6 cm

Etiology:

Cardiovascular
No types of congenital heart disease reliably lead to hydrops
Hydrops plus structural heart problem= near 100% mortality
Aneuploidy common
• Tachyarrhythmia
• Closure of foramen ovale
• Closure of ductus
• Coarct
• Vsd
• Asd
• Chorangioama

Chromosomal
• Aneuploidies

Thoracic
• CCAM
• CDH
• Bronogenic cyst
• Sequestration
• Unilateral or bilateral pleural effusion decent prognosis=15% mortality
• Also short rib, thanatophoric, achondroplasia

TTTS
Fetal Anemia
• Parvo(may follow MSAFP)
• Cmv
• Rarely toxo
• Syphylis
• Alpha thal
• G6PD
• Fetomaternal hemorrhage

Metabolic disease
Gaucher, Tay-Sachs, etc
Some have tried albumin infusion via PUBS
Work up:
Sonogram for above anomalies
Karyotype
Fetal echo
CHAPTER 45- Cardio and Renal Adaptations

Plasma volume increase from 8 weeks and rises 45%
May be due to estrogen stimulating renin system
Red cell mass increases 30% (iron demand is 500mg)
2.3 DPG inc during pregnancy, decreasing affinity of maternal Hb or O2
Ventricular wall mass and end diastolic volume increase, as does contractility
\[ \text{CO} = \text{HR} \times \text{SV} \]
CO increase by 50%
Stroke volume is responsible for early inc in CO, likely due to inc in EDV
Supine position can dec CO by 30%
Uterine blood flow jumps from 2% to 17% of CO (800 ml/min)
Renal, breast and skin flow also in by 50%. No change with brain or liver
Systolic pressure dec 5-10 mmHg, diastolic 10-15

Pressure are 10 mmHg higher in standing or sitting compared to lateral recumbent
Clark, 1989=by late pregnancy

HR
SV
CO \quad \text{GO UP}
SVR
COP \quad \text{GO DOWN}
PCWP
CVP
MAP \quad \text{REMAIN UNCHANGED}

There is a relative hyperventilation in pregnancy with hypocapnia
PCO2 drops from 39 to 30
Ph rises to 7.44 from 7.40
First heart sound is split in most women
Any diastolic murmur and a systolic murmur >2/4 is abnl
PMI is displaced lateral-CXR appears cariomegaly

Labor:
First stage CO rises 25%
49% n second stage
cxt transfer 400 ml of blood from uterus to circulation
systolic transiently goes up up to 35 mmHg and diasolic 25 mmHg
greatest risk for pulmonary edema is postpartum—80% inc in CO
due to:
release of venocaval compression
autotransfusion from the uterus
mobilization of fluid
changes in heart size and CO may persist for 6 mo PP

RENAL:
Kidney length increases by 1 cm
80% of women have dialation of colleocting system (R>L)
renal volume returns to normal 1 week PP, but dilatation may persist for 4 mo
renal plasma flow increase by 80% by 2nd tri, then drops to 50% by 3rd
gFR goes up 50% by end of 1st
(may be due to pre and post glomerular vasorelaxation)
sodium excretion increases due to P4, prostaglandins, and ANF
however, there is a net INC in sodium retention of 900 mg during pregnancy, likley due to inc in aldosterone, steroids and estrogen
renin-angiotensin activity increases—renin substrate increase from liver

net potassium retention
net calcium excretion
glycosuria increase because collecting tubules don’t reabsorb as well
uric acid increase
gain 6-7 liters of water in extravascular space and 2 liters intravascular
plasmal osmolality dec from 289 to 280 (osmoregulation works normally but is reset at a lower level)

CHAPTER 46- CARDIAC DISEASES
May note nonspecific ST and T wave changes
Small pericardial effusion is normal
Some conditions should be managed before pregnancy when possible, and wait 1 yr
High Risk conditions:
Aortic valve disease 15%
Coarctation 5%
Eisenmengers 50%
Marfan’s 25-50%
Mitral Sten w/afib 15%
Peripart cardiomyo 50%
Primary pul htn 15-50%
Tetrology 15%

Some disease may be genetic, such as 20% risk of familial cardiomyopathy
Strong FH in ASD and PDA
Warfarin: nasal hypoplasia, optic atrophy, digital abnl in 15-25% of cases
Thiazides-thrombocytopenia, jaundice, liver damage
LEFT TO RIGHT Shunts
ASD: unlikely to complicate pregnancy, but can sometimes result in afib
VSD: large lesions may also tolerate pregnancy well—but more likely to develop pulmonary hypertension
P=Q X R (pressure drop equals flow x resistance)
You gave have pulmonary htn from either high flow or high resistance
PDA: loud machinery murmur
Eisenmenger’s: most common cause is VSD, followed by PDA
Very sensitive to decreases in venous return
Eventually may become right to left

Primary pulmonary HTN: same as Eisenmenger’s but unknown cause. Recently phen-fen
treat with vasodilators such as nifedipine

OBSTRUCTIVE LESIONS:
Aortic stenosis: bicuspid aortic valve is a common cause
Ventricular hypertrophy
Dependent on adequate venous return
Tachycardai decreases needed filling time
Dilated ventricle ominous sign

Pulmonary stenosis:
RV hypertrophy
Also dependent on adequate venous return

Tetralogy:
VSD
Overriding aorta
Pulmonic stenosis
RV hypertrophy
Clubbing is routinely noted
Pregnancy feasible if VSD and pulmonary lesion fixed

Coarctation:
upper extremity htn, rib notching
Associated with berry aneurysm

RHEUMATIC HEART DISEASE
Should take daily PCN
Uncommon in the US and western world
Mitral Stenosis: enlarged LA and RV
Faster heart rate=less time for filling
Increased blood volume and heart rate may cause decompensation
Avoid lithotomy

Aortic stenosis + mitral likely rheumatic

CARDIOMYOPATHY:
5 yr survival less than 50%
Viral, autoimmune, alcohol
20% of cases genetic
Increased risk of mural thrombus
Possible 50% recurrence risk

MVP: pregnancy avoided only when severe regurg and ejection fraction < 50%

CAD
More common with other disorders, such as diabetes
MI occurs in 1/10,000 pregnancies
Should wait one yr from MI, have stress test etc first before pregnancy
Reponsee of heart to increased pressure=concentric hypertrophy, volume overload is eccentric hypertrophy (dilatation)

Marfan’s:
Autosomal dominant
60% have aortic root dilatation
b1 blocler such as atenolol may be useful
Replaced valves
Warfarin associated with decreased risk of thrombosis
Patient with tissue valves have 2-5% yearly risk of thrombosis without anticoagulation

IHSS:
Autosomal dominant
Normal fall in SVR
Treat with : avoiding hypovolemia, maintaining venour return, avoiding stress and tachycardia
Beta blockade is first line therapy

CHAPTER 47-THROMBOEMBOLIC DISEASE
DVT 5.5 times more likely in pregnancy
Rate=0.5 to 3 per 1000
Leading cause of maternal mortality in US
DVT will progress to PE in 24 %of patients, with a 15% mortality rate.
This decrease to 4.5% risk of PE and < 1% mortality if treated
Factors II, VII, VIII, IX, X inc during pregnancy
Leg swelling defined as > 2 cm difference in circumference
Doppler has 91% sensitivity for popliteal and femoral DVT, 36% for calf

PE:
Small emboli may only result in pleuritic pain
Symptoms:
Tachypnea 89%
Dyspnea 81%
Pleuritic pain 72%
Other symptoms < 50%
PaO2 80-90=11 risk, > 90 very unlikely
SIQ3T3 strain pattern sometimes noted, but usual EKG finding is tachycardia (41%)
Work up usually ABG (>90=observe) followed by
V/Q—if normal—observe. If low intermediate or high prob--Doppler
If Doppler negative—pulmonary angiogram
V/Q scam only 2 millirad
Heparin—found in mast cells
Combines with ATIII to inhibit thrombin and to increase levels of factor Xa inhibitor
Mean MW of heparin=15,000—doesn’t cross placenta or appear in breast milk
May be reverse with protamine—1mg per 100 U heparin given (or twice the amount give to reverse an hourly dose when given IV)
Therapeutic heparin:
Load at 100-150 U/kg, followed by 15-25 U kg/hr
15,000 units into 250 ml, so 60 units/ml
recheck PTT in 4 hrs
usually give heparin for 3-5 days
treatment of DVT or PE for 4-6 mo (if occurs during pregnancy, therapeutic 4-6 mo, followed by prophylaxis 6-12 weeks PP)
adjusted dose=heparin SQ q 12 hrs to get PTT 1.5 X control 6 hrs post dose—as effective as therapeutic heparin in preventing recurrence
Who gets treat (from practice bulletin)
Patients with the following conditions are at highest risk and should have adjusted-dose heparin prophylaxis
(12):
Artificial heart valves (some investigators recommend warfarin therapy after the first trimester in certain circumstances) (26-29)
Antithrombin-III (AT-III) deficiency (with or without a history of thrombosis; also referred to as “anti-thrombin deficiency”) (32, 33)
Antiphospholipid syndrome (some investigators recommend low-dose prophylaxis for this condition if there is no history of DVT) (34, 35)
History of rheumatic heart disease with current atrial fibrillation (36)
Homozygous factor V Leiden mutation, homozygous prothrombin G20210A mutation

LOCKWOOD: who gets heparin in pregnancy
• Patients with VTE in prior pregnancy
• Patients with VTE in past and who have thrombophilia
• Patients with APS

Patients receiving chronic anticoagulation for recurrent thromboembolism
prophylactic (mini) dose—5000 BID—just enough for anti-Xa activity-PTT nl
use this d if patient had previous dvt or pe in pregnancy, but use THERAPEUTIC doses if cases was APS or if patient has had recurrence in past
However, adjusted dose superior to preventing recurrence
osteoporosis if on > 15,000 units > 6 mo (17%) risk
3% risk of thrombocytopenia—severe form due to heparin initiating antiplatelet Abs
early thrombocytopenia-benign (within 3 days) 3-14 days---more serious

LMWH-anti Xa only (it binds ATIII, but this complex cant bind thrombin)
Coumadin INR usually 2-3, but 3 to 4.5 if mechanical valve
Half life is 44 hrs
May reverse with Vit K—5 mg OR FFP
Cont heparin for first 5-7 days of therapy PT=2.5 control since heparin can mildly inc PT
Salicylates and some antibiotics in coumadin activity. Alcohol and barbiturates dec it
IN LABOR (for anyone who was on therapeutic dosing) switch to IV heparin to keep PTT 1.5 control then reinstitute therapeutic 6 hrs PP—low risk of hemorrhage

CHAPTER 48-PIH
Definitions:
Chronic HTN-HTN present and observable before pregnancy or diagnosed before 20 weeks. 140/90
Preeclampsia: 140/90 plus proteinuria
Preeclampsia superimposed upon chronic HTN:
• New onset or worsening proteinuris
• Other abnl labs
Gestational HTN: any blood pressure elevation, detected for the first time after midpregnancy, WITHOUT proteinuria. This diagnosis is temporary, until diagnosis is more clear after delivery.
Final determination made after delivery:
If BP resolves by 12 weeks postpartum: TRANSIENT HTN
If BP persists, patient is diagnosed with chronic HTN
20% of eclamptic patients never had BP reach 140/90
eclampsia may even occur without proteinuria in 13% of patients
Risk factors:
Nulliparity-70% of preeclampsia occurs in a first pregnancy
? effect of economic status
? effect of age—better correlation with parity. Actually more likely at extremes of age, but more likely in the oldest population
? effect of race. Blacks have higher rates of HTN, so perceived increased risk in Blacks may be due to misdiagnosis
risk is 4 X higher if mother or a sister had preeclampsia. If patient had preeclampsia, there is 37% risk that sisters will have it and
16% daughters
Up to 50% risk in diabetics
Up to 20% risk in chronic HTN

PNM higher is superimposed preeclampsia compared to denovo, this may be because:
1. decidual vessels in chronic hypertensives demonstrate similar changes to renal findings in long standing hypertensives
2. preeclampsia occurs earlier in chronic hypertensives

Obesity is a risk factor
Signs and symptoms:
Eye-see local vascular narrowing. Inc light reflex, copper wiring, AV nicking are all signs of chronic disease
Uric acid is most sensitive predictor of preeclampsia
Lab findings:
Inc uric acid
Inc creatinine
dec platelets
Dec HDL and inc LDL
?cerebral edema
hemorrhagic liver changes, followed by infarction from vasospasm
glomerular capillary endotheliosis—electron dense material in endothelial cells
thickened basement membrane
electron dense material may be fibrin and albumin

uterine arteries (in descending order) arcuate-basal-radial-spiral
endothelium of spiral arteries replaced by trophoblast, as is the internal elastic lamina and media—this occurs in decidua and myometrium
in preeclampsia, these changes may be limited to a portion of the decidua and may not extend to the myometrium
also see ‘acute atherosis’
BUT, these changes (poor invasion) may also be seen in IUGR, diabetes
Syncytiotrophoblast is abnormal—necrotic areas, deficient microvilli, abnormal expression of integrins
Summary of above:
1. Preeclampsia is associate with specific organ changes, not merely changes associated with malignant hypertension
2. Pathogenetic factor is NOT hypertension, but rather poor tissue perfusion

Cardiovascular:
BP=CO X SVR
Since cardiac output is not changed in preeclampsia, rise in blood pressure must be due to rise in SVR

Pathophysiologic Changes:
Vasoconstriction not maintained by autonomic nervous system
No increase in catecholamines
Actually a decrease in angiotensin
Endothelin-1 increased
Women with preeclampsia have increased sensitivity to all endogenous pressors so far tested

Blood:
DIC present in 10% of severe preeclamptics
Localized coagulation may occur in the intervillous space—activating coag cascade
Peptides released from damaged endothelial cells such as fibronectin, VCAM, growth factors are increased in preeclampsia
Endothelium important for vasorelaxation, damaged endothelium activates clotting cascade

Renal:
With increased renal damage, permeability to proteins increases, and to larger size proteins
Increased:
Angiotensinogen (renin substrate)
Renin activity
Renin concentration
Angiotensin II concentration
Aldosterone
Angiotensin II has pressure effect, and increases aldosterone secretion. Has neg feedback on JG apparatus. Aldosterone promotes
sodium and water retention

In normal pregnancy need 2.5 times angiotensin II to get same pressor responses as non pregnant
Preeclamptic excrete very little sodium and chloride in urine
Overall:
PNM is higher in preeclampsia
Recurrence: the earlier the disease, the greater the chance of recurrence.
MOST LIKELY, PREECLAMPSIA HAS LOW RISK OF RECURRENT, AND IS NOT A RISK FACTOR FOR LATER HYPERTENSION IN LIFE. PROBLEM WITH PREVIOUS STUDIES THAT SUGGESTED PREECLAMPSIA AS A RISK FACTOR FOR HYPERTENSION WAS ACTUALLY SEPARATING PREECLAMPSIA FROM CHRONIC HYPERTENSION
The chance for recurrence in a future pregnancy decreases as the likelihood that the first episode was truly preeclampsia increases
Pregnancy does not accelerate hypertension but unmasks it
General Principles:
  1. Delivery is always appropriate for the mother, but not necessarily for the fetus.
  2. S/S of preeclampsia not of pathogenic importance—just overall concept of poor perfusion
  3. Pathogenic changes start well before clinical symptoms

CLASP study(1994) low dose aspirin no benefit in reducing preeclampsia risk
Calcium also no benefit
Seizure prophylaxis likely a good idea, because giving prophylaxis based on clinical risk factors not useful ( 20% of eclamptics have no headache, 80% had no Epigastric pain)
Preeclampsia (severe) 3% risk of seizure, reduced to 1% with mag
Mild preeclampsia—seizures 1/550 (Sibai). 50% of seizures occur as outpatients, 17% PP, so mag only prevents at best 30% of 1/550 33% of all seizures occur postpartum, most in first 24 hrs
Lucas 1995—mag more effective than phenytoin
MGSO4:
Unbound to protein and excreted in urine
Half life is 4 hrs with nl renal function
  • Blocks conduction at motor end plate
  • Decreases smooth muscle contractility
  • Depresses CNS irritability
Presence of DTRs suggests Mag levels not dangerously high
Reverse with 10 ml of 10% calcium gluconate solution
If patient seizes through mag, may give valium 5 mg IV, or phenobarb 125 mg iv
Patients don’t need antihypertensives unless diastolic > 105
Hydralazine 5mg,=peak onset 20 min, may repeat q 20 min
If that fails, may give labetalol 20-50 mg iv and may repeat q 10 min, may also give 1mg/min IV CHECK DOSE
May also give nifedipine 10 mg po
Control of chronic hypertension doesn’t seem to affect fetal outcome, main reason is to prevent maternal morbidity
Aldomet 250 mg bid, in doses up to 2 gm daily
May add labetalol 100 mg po bid, up to 2.4 g day
Nifedipine 10 mg po bid up to 90 mg day
Amlodipine 2.5 mg qd
Also may use hydralazine 10 mg po daily, up to 100mg bid

CHAPTER 49-Renal Disorders
40% of ASB will develop UTI
acute infection appears in 1.5% of patients initially negative ASB, accounting for 30% of UTI
Pyelo: 2% of pregnancy, 20% recurrence
Chronic renal disease: general consensus is that with exception of polyarteritis and scleroderma, most patients with chronic renal disease do well
Depends on creatinine:
<1.4 96% successful outcome
1.4-2.8 90% (but 59% rate of PTD, 37% risk of IUGR)high rates of declining renal function
>2.8 50% successful outcome——few get pregnant
high blood pressure in the face of underlying kidney disease requires tighter control of BP < 90
Glomerulonephritis:
Complications happened more frequently in those with some dysfunction
Worsening HTN occurred in 25% of patients
10% of patients had persistent worsening of BP
GFR of 70 or greater associated with better fetal outcome
Urolithiasis:
Prevalence is 0.4%
Most calculi are calcium oxalate
Hydration, pain control (consider epidural)
May place double J stent or percutaneous nephrostomy as needed
Diabetes and renal disease: rare case reports of creat <1.4 and permanent dec in GRF
SLE and renal disease:
Most pregnancies succeed, especially if disease has been in remission 6 mo or longer
Rarely postpartum: flare with pleural effusion, infiltrates, fever, EKG changes, but view of ‘stormy puerperium’ disputed (Lockshin)
Pregnancy not advised with periarteritis nodosa and scleroderma
Wegener’s=vasculitis of small and medium sized vessels. May get nasal bleed, lung and kidney damage
Periarteritis nodosa=also small and medium vessel vasculitis
Solitary kidney=usually well tolerated
Overview: pregnancy does not adversely affect the natural history of kidney disease if kidney dysfunction is minimal and hypertension is absent at conception
Hemodialysis and pregnancy:
Only about 50% successful pregnancy outcome
25% live birth
40% IUGR

General principles:
- Keep BUN < 60
- Avoid hypotension during dialysis
- Avoid hypertension
- Limit interdialysis weight gain to less than 1 KG (which will increase hours of dialysis by 50%)
- Low protein diet

Renal Transplant guidelines:
1. good health for 2 years (because if doing ok at 2 years, 5 yr survival > 80%)
2. minimal proteinuria
3. absence of hypertension
4. no evidence of graft rejection
5. creatinine < 1.4

Do monthly:
- CBC, SMA
- Urate
- 24 hr urine for protein and Creatinine clearance
- clean catch
- increases in proteinuria occur in 40% of patients
- serious rejection occurs in 9% of all patients
- 30% of transplant patients get preeclampsia
- 50% risk of PTD
- 20% SGA
- cover with antibiotics in labor

PREGNANCY HAS NO EFFECT ON GRAFT FUNCTION OR SURVIVAL

Acute renal failure:
1/20,000 pregnancies
Prerenal Vs ATN
Concentrated urine casts noted, diluted urine

Urinary sodium < 20 >25, usually >60 mEq/liter
Two other rare diseases: idiopathic postpartum renal failure and cortical necrosis in pregnancy—both may be related to DIC, HUS

CHAPTER 50-CRITICAL CARE

Maternal mortality 7.1/100,000 overall
- 4.2 for Caucasians
- 22.1 for Af Amer

Advanced maternal age is a risk factor, so rates may be increasing. Increase can also be due to better reporting
Leading cause of mortality:
Hemorrhage 2.7/100,000
Embols 2.2
PIH 1.5
Infection 1.2

Potential indications for Swan:
- Shock
- PIH with oliguria
- ARDS
- Heart disease—class 3 or 4
- Pulmonary hypertension or edema

Complications of Swan:
- Infarction 1.5%
- Sepsis 5%
- Pneumo 3%
- Pul artery rupture 0.2%

Parameters DIRECTLY measured:
- HR
- CVP
- Pulmonary artery systolic and diastolic pressure
- PCWP
- Cardiac output

Others are calculated
Normal wedge goes up from 6.3 to 7.5 in pregnancy
COP goes down from 20 to 18
An elevated wedge may indicate EITHER inc in volume status OR dec LV function

Hemodynamic considerations for special situations:
Mitral stenosis:
- Obstruction to LV filling with resultant fixed cardiac output
- Patient does not tolerate hypervolemia or Tachycardia
- Keep patient dry and comfortable
- Caveat: because of obstruction, wedge pressure may ordinarily be high and not reflective of LV pressure, so ‘high’ pressure in wedge may be needed to maintain CO

Aortic Stenosis:
- Factors that trigger a reduction in blood flow to heart can cause dramatic dec in cardiac output
- Sensitive to HYPOvolemia and Tachycardia
- Keep patient wet and comfortable

Pulmonary HTN:
- High resistance in pul vasculature is obstruction
- Dec in venous return may cause dec in output, as in aortic stenosis

PIH:
Relatively hyperdynamic

Amniotic fluid embolus:
Initial phase: pul vasconstriction, RV failure
End phase LV failure
Beta agonist therapy:
Over time, inc in PCWP likely due to inc sodium retention from tocolytic

MI:
Increase rate seen with older gravida
Inc in reinfarction if delivery within 2 weeks of original

Colloid Osmotic pressure:
Ability of intravascular space to hold onto water by virtue of large molecules
Pulmonary congestion noted with a wedge of 18, pulmonary edema with a wedge of 25
A COP-PCWP gradient less than 4 substantially increases the risk of pul edema
COP goes down in pregnancy, especially near term from 25 to 22

Shock:
Hypovolemic
Cardiogenic
Neurogenic
Central issue relates to a deficiency in tissue perfusion
In hypovolemic—occurs when loss of 15-20% of blood volume
Beyond this—generalized vasoconstriction. Reversible organ changes in corrected in 2 hours—less likely to reverse if not corrected in 4

**Septic shock:**
Septic shock related to endotoxin (gram neg) or exotoxin (gram +)
At cellular level, intense vasoconstriction further worsens local capillary leakage
When local infection noted, bacteremia is low (8-10%)
Only 4% of bacteremic patients develop septic shock in pregnancy, which is low
Mortality rate also appears to be low (0-28% vs 10-81% nonpregnant)
Probably due to younger age groups and amenable areas to debridement
Pregnancy may result in greater degree of acidosis from endotoxin—however, fetus and neonate may be 10 X more resistant to effects of septic shock

**Signs and symptoms of septic shock:**
Shaking chill
Fever
Dec blood pressure
Behavioral changes
WBC may be depressed initially
Initially hyperglycemia—followed by hypo
Eventually: cold extremities, oliguria, cyanosis, profound metabolic acidosis, DIC

**Treatment:**
Inc intravascular volume—may need Swan, may need dopamine (2.5 mg/kg/min) may dec uterine blood flow
Airway
Diagnostic evaluations
Antibiotics
Check lytes
Correct acidosis
Correct coag defects
Correct renal problems

**ARDS:**
Progressive hypoxemia, normal wedge, infiltrates on xray
Treat with PEEP (but PEEP may artificially inc wedge)

**Controversial areas in septic shock:**
Use of steroids
Use of NSAIDS
Use of monoclonal antitoxin

**Hemorrhagic shock:** (Blood loss>500ml)
1/6 c/s have hemorrhage
1/8 vaginal deliveries

**Type of hemorrhagic shock:**

<table>
<thead>
<tr>
<th>Blood loss</th>
<th>symptoms</th>
</tr>
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<tbody>
<tr>
<td>15-20%</td>
<td>Tachycardia, hypotension</td>
</tr>
<tr>
<td>25-35%</td>
<td>as above, oliguria</td>
</tr>
<tr>
<td>&gt;35%</td>
<td>as above, Anuria, altered consciousness</td>
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</tbody>
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**Management of hemorrhagic shock:**
Whole blood clotting in a red top should take <6-8 minutes
Give crystalloid in 3:1 ratio of EBL
Give platelets if <20 K (50K if preop)
Blood transfusion-allergic reactions occur in 4%—due to passive transfer of donor antigens—treat with benadryl—
2% risk of low grade feve due to donor RBC
acute hemolysis from incompatible blood 0.03%
risk of HIV 1/153,000 per unit
risk of hepatitis about .1%, except for Factor VIII concentrate—10%
Common indications for C-HYST
Atony 43%
Accreta 30%
Rupture 13%
Trauma in pregnancy
4/1000 have trauma severe enough to warrant hospitalization
lateral positioning important in maximizing venous return if bleeding
peritoneal lavage is controversial
automobile accident most common cause of blunt trauma
treat:
lateral displacemnt
O2
Establish BPD, gest age (>54 associated with viability)
Mark fundal height and follow to look for abruption

Burns:
Pregnancy does not appear to affect outcome
Each arm 9% of body surface area
Leg 18%
Fornt and back of torso each 18%
If 40% burned, risk of death jumps from 3% to 30%
Burns associated with heavy prostaglandin production—pTL
Perimortem c/s
CPR at best may maintain only 30% of CO
Fetus usually intact if delivered with 4-6 minutes of initiating CPR
If maternal death but still signs of fetal life—deliver without regard to time

CHAPTER 51-PULMONARY DISORDERS
- O2 consumption rises by about 40 ml/min
- 50% O2 sat level rises from about 26 mmHg to 30 (less affinity for oxygen)
- PaO2 doesn’t change
- A-V oxygen difference decrease due to a 40% increase in ventilation
- Inc in ventilation due to rise in tidal volume from 500ml to 700ml
- No change in resp rate
- Residual volume decrease by 20%
- Vital capacity-amount of air that can be expired after a maximal expiration--no change
- Because increase in ventilation outpaces inc in O2 consumption—PCO2 drops from 40 to 30
- Progesterone lowers CO2 threshold in respiratory center (a rise in PCO2 inc respiration by 6l/min in pregnancy-compared to 1.5 ml nonpregnant
- Prog may increase BC carbonic anhydrase—which inc CO2 transfer
- Diaphragm rises by 4 cm, but excursion length increases
- No change in airway resistance—FEV1 doesn’t change
- Transfer factor, which measures ease of CO2 diffusion actually decreases
- Normal 02 sat > 95% and should not change with moderate exercise
- Minute ventilation increases 40% and O2 consumptio by 15%

Asthma:
Maximal respiratory effort may inc 1000% over baseline, compared to 300% for cardiac, so it is unusual for pulmonary problems in pregnancy to be severe

Asthma course unchanged in pregnancy
Steroids given may result in slightly higher PTD and IUGR
Treat with:
Occ bronchodilators
If failed then standing inhaled steroids plus bronchodilators

CF
Most common genetic disorder among caucasians
Patients living longer because of aggressive pulmonary toilet and prophylactic antibiotics
150 CF mutations—genetic testing only identifies 80%
CF patients have 24% risk of PTD and 8% perinatal mortality
Prognosis depends on presence of cor pulmonale or and PO2 < 60
FEV1 should be at least 50% of predicted
CF patients may also have diabetes and cirrhosis
In labor, patients may sweat a great deal with high sodium levels in sweat

TB:
Ethambutol, INH, pyrazinamide safe
Streptomycin 15% 8th nerve damage

Sarcoid:
Tends to get better during pregnancy, may relapse PP due to dropping cortisol
ACE levels greatly vary during pregnancy

Wegener’s:
Necrotizing granulomas in lung, Upper resp tract, kidneys
Treated with prednisone and cyclophosphamide---cant use first tri

ARDS:
Increased capillary permeability and dec lung compliance
USE PEEP to force fluid intravascular
Normal wedge
50% mortality
infection, PIH and hemorrhage main causes

CHAPTER 52-Hematologic Disorders

Anemia:
Define as Hb less than 11
Look at morphology and retic count (low in iron def, thal, siderblst, but retic high if due to hemolysis)
Anisocytosis-variation in size
Poikilocytosis-variation in size
Haptoglobin low in hemolysis
Paroxysmal nocturnal hemoglobinuria—osmotic fragility
In Fe def—TIBC
Iron deficiency characterized by ferritin < 20
Normal changes in pregnancy:
Plasma volume increases 47%, red cell mass 17%
Pritchard showed 50% of women had minimal iron stores in the first trimester
A woman need 1.5-2 mg iron/day, there is about 6 mg in typical diet and only 10% absorbed
Folate:
Is a polyglutamate
Absorbed in proximal jejunum
Pancreatic conjugase must convert folate into monoglutamate before absorption
Anticonvulsants, oral contraceptives, sulfa drugs interfere with conjugase

Serum levels dec—followed by hypersegmented PMNs---dec in RBC folate---ovalocytes—abnl marrow
Rough skin and glossitis
Treat 1 mg po 3X day…parenteral if malabsopotion
Retic with 3-5 days

B12:
Hydrochloric acid and pepsin must free cobalamin from protein—it then binds intrinsic factor and is absorbed in ileum
Neuropathy—posterior spinal colmns
Pernicious anemia—abnl intrinsic factor, may be post gastrectomy. May also be caused by malabsorption
Cant do schilling test in pregnancy because of radiation
Treat with 100 mcg day for 6 weeks
Microcytic anemia:
Besides serum iron, TIBC, ferritin, retic count, Hb electro, also should do guaiaec
Fe def—low ferritin—high TIBC
Chronic disease-TIBC low
Also—consider lead level
Treat with iron
Reticulocytosis should be seen within 7 days and Hb rises by 1 gm /week

Normocytic anemia:
Coombs test-immune vs. nonimmune causes
Non-immune-spherocytosis, elliptocytosis
If myeloid:erythroid ratio > 4:1—chronic disease and endocrine disorders
If <2:1---ineffective erythropoiesis

Macrocytic anemia—B12 and Folate

Effects of anemia:
CONTRADICTION info on IUGR and PTD, even if Hb=6
Fetaus preferentially gets iron
Spherocytosis:
Most common form of inherited hemolytic anemia
Autosomal dominant
May be precipitated by any insult
Test osmotic fragility
Supplemet folate, may need to transfuse—do splenectomy
Autoimmune:
Warm antibodies---usually directed againts Rh antigens and precipitated by:
Malignancy
SLE
Drugs
Cold antibodies: directed against anti-I: mycoplasma and mononucleosis
80% of patients respond to steroids

G6PD:
X linked
Mediterranean, sephardica, 12% black males
Drugs and fava bean may cause hemolysis

Aplasia:
Insufficuent stem cells or increase in stem cell suppressors
CBC reveals pancytopenia
Temporize with androgens but ultimately treat with bone marrow transplants

PNH—red cells unusually susceptible to lysis by complement
Marrow aplasia noted, but 50% of deaths due to thrombosis

Alpa-Thal:
Alpha thal-2—silent carrier: one gene deletion
Alpha thal-1 (minor)—2 gene deletion (Hb is low, but electro is basically normal)
Hb H—3 genes (tetramer of 4 betas) (5-30% Hb H in adults, 25% Barts in cord blood)
Hydrops fetalis (Hb Barts is 4 gammas) (80% Barts in cord blood)
Asians more likely to have cis mutation, afr am trans

Beta-thal
B0-no production of B chains
B+ some production-abnl forms
See increases in Hb F and Hb A2
not due to a gene deletion
may be due to a dec in mRNA
severe homozygous form not a problem in utero, because of gamma chains. Disease appears 3-6 mo after birth. Death in 20s due to myocardial hemochromatosis

Sickle trait:
Generally do well—prone to utis
Should receive iron therapy

Sickle cell disease
Valine for glutamic acid substitution on Beta chain
Adults may have growth restriction and skeletal changes
Maternal morbidity same as nonpregnant
21% risk of SGA seems to be only morbidity for fetus
some MFM advocate prophylactic exchange transfusion at 28 weeks (take off 500ml, give fluid, infuse 2 units) others say no change in outcome if Hct > 25

work up/care:
- Folic acid
- Pneumovax vaccine
- Urine c &S
- Optho exam
- Growth scans

Hb C
Lysine for glu
Generally mild disease, even in homozygotes---incidentally discovered

SC disease:
C is lysine for glutamic acid substitution
Patients normally are very health compared to SS
40-60% will behave as SS during pregnancy, and may be prone to very rapid splenic sequestration

Hb S-B thal
Compared to sickle cell trait, in which Hb A>> HbS, these patients have mostly Hb S
Clinical course parallels sickle cell anemia but is generally milder

Hb E
Most patient have a mild anemia, but can be profound when with B0 thal

WHITE cells:
Neutrophilia and left shift common in pregnancy
Dohle bodies, associated with bacteremia, also normal (rough ER inclusions)
Neutropenia may be due to lupus, neoplastic disease or drugs
Drugs:
Dilantin
Haldol
Flagyl
PTU

Acute Leukemias
ALL is most common acute leukemia of childhood
Treatment does NOT cause sterility

Acute nonlymphoblastic leukemia eventually becomes chronic and resistant to therapy
If either of above occur during pregnancy—treat because of risk of bleeding and death in a short time
Course of leukemias not affected by pregnancy

CML—death in 4 years, but disease is slowly progressive. Treat with busulphan which is teratogenic---may wait until delivery since slowly progressive---ultimately need bone marrow transplant
Hodgkins:
Some patients may experience lasting amenorrhea, but most do not
Amenorrhea more likely to occur in those getting radiation + chemo
Pregnancy DOES interfere with work up, and some experts recommend termination 1st tri

COAGULATION disorders:
Plauelets bind to site of injury and degranulate and release ADP. ADP causes platelet activation and attracts more platelets
XII, XI, IX, VIII—intrinsic activator and Tissue factor both work to activate common activator below
X + V + PF3 + Ca—common activator converts—
Prothrombin to thrombin
Which converts fibrinogen to fibrin
Fibrin polymer stabilized by Factor XIII
Fibrinolytic—
Plasminogen to plasmin
Urokinase and streptokinase activate plasminogen

XII, XI, IX, VIII—vWF—external activator

COAG disorders:
Actual problems much more common than hereditary

Thrombocytopenia:
Each bag of platelets inc platelets by 5 K

Gestational thrombocytopenia:
6% of patients (defined as < 150K) have thrombocytopenia—75% is gestational
hypertension =21%
ITP or other immune=4%

ITP:
Antiplatelet Ab causing platelet destruction by reticuloendothelial system
May be cause by PAIgG or PA-C3 (complement)
To establish diagnosis:
Normal CBC
Normal bone marrow
Increased number of large platelets
Normal coags
No other obvious causes
Treat:
Steroids—1 mg/kg—75% remission, but sustained in only a third
Immunosuppression: IVIG and plasmapharesis now second line—followed by:
Splenectomy

No decrease in ICH with cesarean delivery
Only 6% of neonates will have platelt counts < 50K

NAIT:
1/5000 pregnancies
80% recurrence
IVIG
See chapter 30

Aspirin acylates cyclooxygenase for their lifespan
Usually stop within 10 days of surgery
Von Willebrands:
Auto dominant
Inc PTT
Lack of ristocetin platelet aggregation
DDAVP 0.3 mg/kg IV over 30 min OR
Cryo 0.4 bags/kg

Hemophilia A Factor VIII def
Hemophilia B—Factor IX deficiency
X linked
Female carriers unaffected—little bleeding during delivery
Factors VII and IX do not cross placenta
Give Factor IX 50 units/kg load, then 25 U kg q 12 hr

Acquired antibodies to Factor VIII—does not correct with mixing

Factor X—rare autosomal recessive

Factor XI—autosomal recessive
XI goes down in pregnancy
FFP to keep levels above 40%, usually takes 10 mg/kg/day
Major insult of DIC is small clots in microcirculation
DIC caused by a) thromboplastic agents B) endothelial damage c) sepsis, embolus

TTP: often death in 3 mo
Thrombocytopenia
Hemolytic anemia
Fever
eurologic findings
nl fibrinogen
treat with plasmapharesis

HUS: young age, incited by viral or bacterial infection
Thrombocytopenia
Hemolytic Anemia
Renal dysfunction
Hypertension
nl fibrinogen
Usually just give supportive care

CHAPTER 53—DIABETES
Incidence of diabetes 3-10%
80% gestational onl
risk of birth injury 2X
risk of c/s 3X
risk of NICU admission 4X
before insulin 30% risk of abortion, 50% incidence of stillbirth
Normal glucose regulation:
• Tendency to develop fasting hypoglycemia (average 74—very low)
• Relative insulin resistance
• Augmentation of insulin release (mean levels 30% higher)
When process is abnl—fetal hyperglycemia results in fetal hyperinsulinemia:
• Excessive nutrient storage
• Depletion of O2 stores (HYPOXIA)
• outpouring of catecholamines
this (HYPOXIA) in turn leads to polycythemia, hyperbili, cardiac hypertrophy etc etc
Birth Defects:
Background risk of MAJOR anomaly 1-2%
Cardiac RR 18X 8.5%
CNS  16X  5.3%
  Anene  13X
  SP BIFIDA  20X

HgA1C
<7  7%
7-9  14%
9-11  20%
>11  25%

why? Possibly due to excessive formation of oxygen free radicals….some evidence by REECE et al that giving antioxidants to mice decreases risk

Shoulder:
Based on birth weight
< 4000  0.1-1 5% non diabetic  0.6-3.7% diabetic
4000-4499  1.1-10%  4.9-23.1%
>4500  4.1-22.6  20-50%
growth velocity from diabetes really takes off >28 weeks
AC only variable significantly increased
Cord and amniotic fluid insulin levels appear to correlate with macrosomia
IGF-1 and 2 correlate with macrosomia

POSTPRANDIAL glucose levels correlate best with fetal weight---
if <120—20% risk of macrosomia
if >160—35% risk
fasting levels do not contribute more than 12% to birth weight variance
maternal obesity correlates well with macrosomia
impaired glucose tolerance = 110-126
diabetes—fasting > 126, OR random or 75 gm > 200
targeted screening only identifies 50% of diabetics
cutoff of 135 detects 99% of diabetes, compared to 80% with 140
140=15% test positive, about a third have diabetes. If 135, 20% TEST POSITIVE
If GCT >200, about 90% chance of GDM but 66% in Caucasian (use 216—all diabetics)

Fetal Problems:
Diabetic women with good control have similar rates of miscarriage
Women with vascular disease more likely to have IUGR
Polycythemia
Shoulder dystocia and birth injury
Hypoglycemia—blood sugar < 35 2 hrs after birth
Hypocalcemia—unclear cause—hypoxia? Prematurity
Hyperbilirubinemia
Hypertrophic cardiomyopathy—may be as high as 30%
Problems with neonatal adaptation should be expected in 50% of A2 and higher and 20% of A1 diabetics
RDS has declined from 31% to 3%. May be surfactant, but also dec compliance and inc thickness

Maternal Complications
Retinopathy=98% of women with IDDM for 15 yrs or more
Begins with extravasation—then ischemia (cotton wool) then proliferative
20% of patient may experience worsening, which is back to baseline by 6 mo PP
minimal disease may require trimester visits

Nephropathy:
Kimmelsteil-Wilson—glomerosclerosis(thickening of basement membrane then growth of mesangium)
Renal function typically improves until third tri, then may drop off sharply
Pregnancy does not alter course of renal disease
Chronic HTN—more likely the longer the diabetes
Creat clearance every trimester
Preeclampsia 12% risk in DM
Diabetes and heart disease—very poor outcome 75% maternal mortality—29% perinatal loss rate
DKA:
Hyperglycemia
Osmotic diureses from the glucose
Patients present with hyperventilation, altered mental status, dehydration
Treat DKA:
15-20 U IV insulin bolus then 5-10 U /hr
give 0.9 NS at 1 L/hr until good urine output, then 0.45 NS at 500 ml/hr
If K high, supplement when urine output established
If K low, give 20 mEq in each bag right away
Give bicarb if pH < 7.0
May need to give potassium phosphate
Preconception counseling:
Thorough renal cardio assessment
Do TFTS
Diet:
3 meals and 3 snacks
40% carbs
25% protein
32% fat
snack contain about 25 mg carb with small amounts of protein and fat
35 cal/Kg
Carbs should be low glycemic foods—absorbed slowly—rice and corn better than potato and dextrose
Insulin
Lispro peak 1hr duration 2
R 2hr 4
NPH 4 8
Ultraente 8 20
Lispro may be substituted 1:1
Ultraente typically given 10-15 U qhs at dinner time
Insulin pump…lowest infusions rate 11-4am
Usually
11-4am 0.6 U hr
4-7am 1.3 (usually there is predawn peak)
7am to 11pm 1.0 units
PLUS—premeal boluses of Regular
Oral agents:
Sulfonylurea-augment insulin
Metformin and troglitazone---ameliorate insulin resistance
Alpha glucosidases—delay breakdown of oligosacchrides into monosacch
Gestational Diabetes management:
When postprandial sugars are less than 120 vs > 120
Dec c/s rate from 30% to 20%
Risk of macrosomia dec 18 to 7%
Antenatal Testing : 2 X weekly NS/AFI
as early as 28 weeks with poor control
34 weeks for the rest
Deliver with amnio at 37-38.5 weeks
Delivery by 40 weeks in others
Weight estimation:
Hadlock and Sherman seem most accurate
(66% within 10% of birth weight)
serial EFWs do not add to detection
ultrasound has about a 65% sensitivity for detecting macrosomia (>4000)
PPV is 79% for > 4000 but only 33% (>4500)
No evidence for induction to prevent macrosomia
If 20% risk of shoulder in patients >4500, and 20% of these have injury, and permanent in 5%, need to do over 400 sections to prevent one permanent injury
Intrapratum management:
Goal is to avoid hypoxia and ensure a smooth fetal transition
Normally have D5 at 100 cchr:
0.5 U/hr 80-100
1.0 100-140
1.5 141-180
for GDM---just avoid dextrose---rarely need insulin
Infant hypoglycemia: the degree of hypoglycemia best correlates with maternal control over the past 6-12 weeks
Do frequent glucose checks and early oral feeding
Breast feeding may be protective of future diabetes in offspring (RR=0.4)
Fewer IDDM pts breast feed, but will feed longer with no higher risk of complications
IDDM who breast feed should be encourage to take about a 150 cal snack or fluid while nursing to avoid a reactive hypoglycemia

CHAPTER 54-THYROID DISORDERS
T4 is converted to T3 in the cell, where it then regulates metabolism
Need 80-1000mcg iodine per day
Iodine is reduced to iodide—80% cleared by the kidney
Energy is required to move iodide into the cell—rate limiting step—controlled by TSH

After moving into the cell, organification occurs—converts iodide BACK to iodine and binds to tyrosyl residues
Thionamides work by competing with iodine for peroxidase, which binds iodine to tyrosyl residues
Thyroglobulin-prohormone containing 6 molecules of T3 and T4—thyroglobulin is then digested by proteases—controlled by TSH
TSH responsible for:
Iodide transport
Organification
Thyroglobulin synthesis
Thyroglobulin digestion
T4 half life one week because protein bound
T3 is 1 day
Most bound to TBG
All t4 come from thyroid directly, but only 20% of T3 (converted from T$ by liver and kidney)
T3 has 10X better affinity for receptor than T4
RT3 comes from removing iodine from inner ring
Goiter in pregnancy:
50% nontoxic
28% autoimmune
22% subacute thyroiditis
goiter is NOT nl finding in pregnancy
pregnancy associated with rise in TBG, but free hormone levels should be unchanged
early in pregnancy—inverse correlation with BHCG and and TSH levels. T4 levels inc as hcg rises
25,000 units hCG=1.0 U TSH
** maternal thyroid hormones do cross placenta and play an important role in early fetal development—any thyroid hormone needed for fetal neuro development prior to 12 weeks must come from mother

iodide, beta blockers and dopamine also cross placenta
TSH does not cross placenta
Fetal T4 levels rise between 10-30 weeks
T3 levels substantially lower than adult throughout gestation
At birth, burst of conversion from T4 to T3 and release of T3, probably to help thermoregulate—this doesn’t seem to happen in preemies
TSH (3rd gen) and free T4 best tests to evaluate thyroid function
T3 resin uptake is low, indicating increased saturation of binding sites
• If free T4 normal and TSH suppressed, should measure T3 to r/o T3 toxicosis
Antibodies:
TSI-Grave’s disease
Anti-thyroglobulin, anti-thyroperoxidase and antimicrosomal antibodies are now called anti-TPO
3% of nonpregnant patients have anti-TPO
this rises to 5-15% in pregnancy and perhaps 50% of these patients may develop postpartum thyroiditis
Drugs:
Propranolol—blocks conversion of T4 to T3 but also stimulates TSH release
Glucocorticoids—inhibit conversion of T4 to T3 but INHIBIT TSH release
Dopamine and dopamine agonists dec TSH release
Dilantin—decline in T4 levels by 20-30% because inhibits binding of T4 to globulin
Free T4 usually remains in normal range in nonthyroidal illness—may also get inc rT3
Severe hypothyroidism associated with infertility because inc TRH stimulates Prolactin
  • women who are IDDM have high incidence of hypothyroidism
Hyperthyroid doesn’t usually affect fertility
Hyperthyroidism and Pregnancy:
  2/1000 patients
95% of hyperthyroidism in pregnancy due to Graves’, followed by toxic multinodular goiter and toxic adenoma
symptoms such as heat intolerance, fatigue, anxiety similar to that of pregnancy
weight loss, onycholysis, HR >100 not usually found in pregnancy
also see pretibial myxedema, ophthalmopathy
TSH <0.05 virtually diagnostic
May also find a normocytic normochromic anemia
TSI should probably be measured at 30 weeks because values > 300% of normal are predictive of fetal hyperthyroidism
Other causes of hyperthyroidism unique to pregnancy
  • 50% of GTD will have evidence of hyperthyroid
  • hyperemesis—degree of thyroid stimulation from hCG correlates with severity of n/v. vomiting usually not improved by
    adding antithyroid drugs
toxic multinodular goiter-lumpy bumpy gland
jodbedow—nodular goiter given iodide precipitating hyperthyroidism
*hyperthyroidism untreated is associated with increased rates of PTD and PNM
Thionamide therapy
  • want to control disease without making fetus hypo
  • PTU, but not methimazol, blocks t4 to T3 conversion
PTU
  • PTU-usual 150 mg q 8 h—most patients how improvement in 1-2 weeks, but maximal effect may take 6 weeks
  • Taper dose based upon FREE T4, NOT TSH—which may lag for several weeks
  • Pruritis, rash, nausea, hepatitis or lupus like syndrome may occur in 1-5%
  • Agranulocytosis most common serious side effect—0.1 %—should probably get baseline CBC and a follow up
Concern with methimazole causing aplasia cutis
Concern about thionamides causing hypothyroidism in the fetus and impairing neurodeve-CHECK FETUS with ultrasound to look for
goiter, bradycardia
Thyroid storm:
Thionamides
SSKI-5-10 drops twice per day
Beta blockers-propranolol 40 TID
Tylenol/asa
? steroids

if radioactive iodine given by mistake thionamide will dec fetal radiation exposure by a factor of 100—also give SSKI
surgery may be necessary, after 2 week treatment with SSKI and PTU
Graves’—1% risk of fetal or neonatal thyrotoxicosis
A mother s/p thyroid ablation obviously still can have a fetus with thyrotoxicosis
Fetal thyrotoxicosis:
FH>160
IUGR
Advanced bone age
Craniosynostosis
Thionamides wear off after 5-10 days, but TSIs are present for 20 days, so fetus may have delayed thyrotoxicosis
Hypothyroidism in pregnancy
1/2000
  risk of
  • Low birth weight
  • PIH
  • Abruptio
  • Stillbirth

Signs
- Lethargy
- Inc wt gain
- Cold intol
- Hair loss
- Brittle nails

Lab results depend on cause: if pituitary, free T4 and TSH low
May also see elevated LFTs and anemia (mostly from menorrhagia)
Not only may diabetics be more likely to have hypothyroid, but treatment may increase insulin requirements

Hashimotos’
- most common cause of hypothyroidism in reproductive age women 8-10%
- anti-TPO
- predilection for other autoimmune disorders
- goiter present

drugs that may cause hypothyroidism:
Inc clearance of thyroxine
- dilatin
tegretol
rifampin
amiodarone—dec conversion from T4 to T3
dec aborption of synthroid
alum hydroxide
iron
carafate

Lymphocytic hypophysitis:
Rare disease, more common in women, associated with postpartum thyroiditis
May be confused with Sheehan’s
Iodine deficiency—inc TSH—goiter—rare in US
Treat:
Check TFTs q trimester—expect to go up
Mean inc in dosage of 45%

Cretinism:
Mental reardation
Mutism
Strabismus
Spasticity
If thyroid hormone deficiency is corrected within 3 months may have normal outcome
Solitary nodule—fine needle aspiration and check TFTs.
Most cancers are well differentiated papillary or follicular cancer—cure is surgical with I131 ablation after delivery

Medullary and anaplastic tumors may be more aggressive

Postpartum Thyroiditis
Abnormalities in thyroid function occur in 5% of PP women
Symptoms often occur after 6 week visit, and patient attributes this to fatigue, etc
Usually there is a brief thyrotoxic phase for 2 months, followed by 6 mo of hypothyroidism
80% return to euthyroid after 6 mo, but 25% permanently hypothyroid
MAY BE MISTAKEN FOR PP DEPRESSION
Histologically a destructive lymphocytic thyroiditis
Anti-TPO usually improve during pregnancy and then rebound 6 mo PP, coinciding with the peak of PP thyroiditis
Treat with thyroxine, but withdraw gradually after 1 yr to check for resolution
Radioactive iodine (low uptake) can distinguish PP thyroiditis from Graves (high uptake)
Thionamide therapy usually doesn’t help because it is due to release of stored hormone from a damaged gland, not inc synthesis
25% recurrence risk

CHAPTER 55 OTHER ENDOCRINE DISORDERS
Posterior pituitary is 5/6 of the glands total volume
Hypothalamus connected to posterior pituitary through hypophyseal arteries, which drain into portal veins which also drain anterior lobe, so all is connected
TRH inhibits dopamine which inhibits Prolactin
Anterior pituitary hormones need to be stimulated to be released (eg GnRH) except Prolactin, which is tonically inhibited by dopamine

**Pregnancy—**
- Pituitary doubles or triples in size
- GnRH and GH dec
- CRH inc
- ACTH inc—despite rises in cortisol

Posterior pituitary is storage vessel for oxytocin and vasopressin

Osmolarity decreases in pregnancy—osmoreceptors reset

Fetal pituitary feedback loops fully functional by 20 weeks

**Disorders:**

**Hypothalamic:**
Craniopharyngioma—from Rathke’s pouch—H/A, visual disturbances, diabetes insipidus

**Prolactinoma**
- most common anterior pituitary lesion:
- Bromocriptine safe in pregnancy even though ergot derivative---no inc in PTD
- Usually D/C bromocriptine when pregnant
- Microadenoma (<10mm) Macro > 10 mm. Less than 5% problems with micro
- Usual to treat macroadenomas before pregnancy—13-25% H/A, visual changes

**Treatment:**

- **Micro:**
  - Stop bromocriptine
  - Symptomatic evaluation
  - Visual fields q TRIMESTER
  - If problems, image and restart bromocriptine
  - If worsen, consider steroids and surgery

- **Macro:**
  - Stop bromocriptine
  - Symptomatic evaluation
  - Visual fields q MONTH
  - OK to breast feed with microadenoma

**Acromegaly:**
Coarse features, spade like hands

Use a glucose tolerance test, which, which should suppress GH below 2 ng/ml
(usually due to chromophobe adenoma)

carbo intolerance occurs in 50% of acromegals and diabetes in 20%
acromegaly paradoxically may respond to bromocriptine

**Cushing’s Syndrome**
State of hypercortisolism that may result from:
- Excess pituitary ACTH
- Ectopic ACTH
- Adrenal adenoma

**Cushing’s Disease is pituitary form**
In pregnancy adrenal adenoma is much more common than usual (40%) followed by Cushing’s (40% too)
Test differently in pregnancy: low dose dex suppression is 2 mg day for 8 days, not 2
(look for plasma cortisol to be suppressed below 6 mcg/ml)
To distinguish pituitary from adrenal lesions, then do high dose test (8 mg/day for 2 days)
In pituitary form, would expect >50% suppression of plasma cortisol and low levels of ACTH

**Cushing Syndrome—Maternal Fetal Complications**
- 61% PTD
• 50% IUGR
treatment does not seem to affect fetal outcome
treatment is with metapyrone (blocks cortisol treatment)
also ketoconazole—inadequate masculinization in male fetus
aminoglutethimide—virilization of female fetuses

Sheehan’s Syndrome
Occurs in 4% of patients following hemorrhage
Degree of bleeding doesn’t seem to correlate with risk
Outcome seems to improve with hormone replacement therapy
  • amenorrhea
  • Low TSH and free T4
  • Low cortisol with low ACTH
  • Supplement synthroid 0.2, prednisone 5 mg bid. No need for mineralocorticoids

Lymphocytic Hypophysitis:
Of 44 cases in literature, 43 in women
In 32, disease occurred close to pregnancy
Many women also had evidence of autoimmune disease

Diabetes Insipidus
  • Vasopressin and Oxytocin made in paraventriculur and supraoptic nuclei
  • No disorder of Oxytocin release of production known
  • Idiopathic in 30% of cases, then cranial injury, infection, also X-linked recessive form that rarely affects females
  • Doesn’t seem to affect pregnancy
  • Treat with DDAVP 1.0 to 2.5 mcg each day

ADRENALS;
Mineralocorticoids-glomerulosa
Glucocorticoids----fasiculata
Sex steroids--------reticularis
Renin (kidney)---converts Angiotensinogen (liver) to ---angiotensin I---which converts itself to Angiotensin II---which results in aldosterone secretion
CBG increases by 3 X during pregnancy
Placental ACTH and CRH not suppressible by exogenous steroids
Aldosterone levels 5-8 X normal

Addison’s disease
  • Autoimmune causes 75%
  • N/v, fatigue, weight loss, hyperpigmentation
  • Test by giving ACTH and looking for 7 mcg cortisol rise
  • Treat with prednisone 5 mg bid and .1mg 9-fludrocortisone qd
  • No pregnancy problems except mild dec in birth weight

Hyperaldosteronism
  • Usually due to adrenal adenoma
  • Hypertension, hypokalemia, and kaliuresis
  • Diagnosis---failure to suppress aldosterone with salt loading

CAH:
  • 21 hydroxylase 95% of cases of CAH
  • 11-hydroxylase 2nd most common
  • all autosomal recessive
21-hydroxylase deficiency
- check 17-OH progesterone
- shunting of these compounds lead to excess androgen
- may be inc risk of c/s from bony pelvic abnormalities from premature closure of epiphyses
- prenatal diagnosis is available
- start dex 20 mcg/kg maternal weight. Start by 8 weeks, and continue til term if female fetus, stop if male
- this may reduce, but not necessarily eliminate maculization

11-hydroxylase
- presentation similar to above, but with added finding of HTN
- find elevated DOC

17 hydroxylase---hypoandism, as does 3 beta deficiency

Disorders of adrenal medulla:

Pheochromocytoma:
- MEN II, 12% malignant
- Elevated VMA, catechols, and metanephrine
- Treat in pregnancy with alpha adrenergic blockade—phenoxybenzamine

Luteomas and theca lutean cysts may cause masculinization of a female fetus

Parathyroid glands:
- Calcium is maintained by PTH and vitamin D
- Vitamin D is 25 hydroxylated in the liver and 1 hydroxylated by the kidney
- 1,25 OH D is responsible for intestinal absorption
- PTH is stimulated by hypocalcemia and suppressed by elevated ca, mag, and vitD
- Ionized form of calcium is metabolically active, not protein bound or chelated
- Total calcium falls due to a drop in serum albumin
- PTH like substance made by placenta

Primary hyperparathyroidism:
- Usually due to a single adenoma, although hyperplasia and carcinoma have been reported
- Stones, bones, groans, and psychic overtones
- Diff includes malignancy, hypervitaminosis A&D, and hypocalciuric hypercalcemia
- 23% risk of neonatal tetany
- 10% risk of stillbirth
- pregnancy may be protective—30 g of calcium goes to fetus—but may be crisis (>14 mg/dl) after delivery
- surgery mainstay of treatment, and can decrease pregnancy complication rates
- acute treatment with hydration, lasix, oral phosphates (neutra phos 500mg q8h), and ultimately mithramycin(25 mcg/kg iv q 48hrs) and dialysis

Hypoparathyroidism:
- usually s/p surgery
- low calcium combine with low PTH and vit D diagnostic
- Chvostek sign—tapping of facial nerve to get contraction
- Trousseau—tetany within 3 min of inflating BP cuff
- Long QT interval
- Neonatal hypocalcemia may result
- Treat: Vit D 50,000/day, 1500 mg Ca or calcitriol 1.0 mcg/day
  - Aim to keep ca 8-9mg/dl and avoid calciuria (>250mg/24 hrs)

Osteoporosis in pregnancy:
- Prolonged Amenorrhea from breast feeding dec bone mass
• Loss of calcium from breast milk

CHAPTER 56 - GASTROINTESTINAL DISEASE IN PREGNANCY

By survey, only heartburn (48% 3rd tri) consistently more frequent in pregnant women

Constipation and water brash NOT more common

Alteration in GI function:

Esophagus
• Motility unchanged
• LES relaxed - This effect is increased throughout gestation
• Relaxation DOES NOT clearly correlate with prog levels

Stomach
• Parietal cells make acid, which converts the proteolytic enzyme pepsinogen into pepsin
• Acid secretion MAY be reduced
• Gastric emptying unchanged, except perhaps at term

Small Bowel:
• Transit time longer during pregnancy
• This may increase absorptive capacity

Large Bowel
• P4 in vitro slows transit time
• Increased endogenous opioids which might inhibit colonic activity

Nausea and Vomiting
• 66% patients with nausea
• 44% with vomiting
• Peak 8-12 weeks

Hyperemesis
• .3 to 1% of pregnancies
• Defined by electrolyte abnormalities, wt loss, elevated LFTs
• LFT elevation may be due to effects of starvation and dehydration
• Chemoreceptor trigger zone in area postrema
• Vomiting center-located near cranial motor nuclei
• Must consider biliary disease, pancreatitis, PUD
• Hyperemesis associated with dec risk of sp nb

GERD
• Defined as abnl reflux of gastric contents into esophagus
• May have severe esophagitis without symptoms
• Related to dec pressure in LES
• Symptoms occur in > 50% of pregnancy
• Treat with antacids, H2 blockers
• May also use proton pump inhibitors such as Prevacid or motility enhancers as cisapride (propulsid)

PUD
• PUD in pregnancy - 45% no symptoms, 44% improved. Only 12% no improvement
• Estrogen may exert protective effect on GI mucosa
• Typical symptoms epigastric pain, worse pain on empty stomach, awakening in early morning hours
• Treat — usually antacids and carafate in pregnancy

If severe, may use H2 blocker for 8 weeks, or H2 blocker for 4 weeks plus prevacid. 90% cure. The regimen of choice is triple therapy with a proton pump inhibitor (eg, lansoprazole 30 mg BID or omeprazole 20 mg BID), amoxicillin (1 g BID), and clarithromycin (500 mg BID) for two weeks.

• If H. Pylori — give 2 antibiotics plus bismuth and prevacid, but can usually wait until after delivery
• Zollinger-Ellison-gastrin secreting tumor
IBD
- Ulcerative colitis - mucosal disease. Involves rectum and moves in continuous fashion. Diarrhea, bleeding, pain
- Crohn’s-transmural, skip lesions, granulomatous. Involves rectum 50% of time, common in colon and terminal ileum
- Fertility rate unaffected in IBD
- IBD does not have adverse affect on pregnancy outcome
- Pregnancy doesn’t affect IBD
- Treat:
  - Predinsone—doesn’t cross placenta
    - May be increased risk of IBD in children

Ogivie’s syndrome—acutely dilated gas filled colon due to distal obstruction. Associated with mag sulfate, c/s.

Endoscopy appears safe in pregnancy

Appendicitis:
1. 1/1500 pregnancies
2. fetal loss 10-15%, mainly due to PTL or IUFD
3. 25% of patients may have pyuria or hematuris—confusing diagnosis
4. rebound and rectal tenderness often signs
5. muscle splitting incision over point of maximal tenderness

CHAPTER 57-LIVER- BILIARY - PANCREAS
- palpable liver is NOT normal
- palmar erythema and spider nevi are normal

Cholestasis:
- 2ND most common liver disorder unique to pregnancy
- prevalent in Chile, Scandinavia, Australia, Canada, China
- probably results from genetic predisposition for increased sensitivity of bile ducts to effects of estriogens
- Fam Hist present in 50% of patients, also HLA B8 and BW16

Symptoms:
- Pruritis—legs and trunk
- Jaundice—CONJUGATED bili >6
- Minor LFT elevations

Fetal effects
- Inc meconium
- Inc fetal distress
- Inc IUFD

Treat:
- Ursodeoxycholic acid—reduces concentration of bile acids by stimulating biliary transport
- Other agents appear to be no benefit
- 300mg BID

Acute Fatty Liver
1/10,000 pregnancies
maternal mortality improved from 70% to 25%
recurrence risk 25%
- related to LCHAD deficiency
- autosomal recessive
disease in mother seems to be dependent on her carrying an affected fetus
Inc in WBC count
Uric acid very high compared to creatnine
LFT 3-10 times control
Low glucose
Male fetus more likely

Path-microvesicular changes with Oil Red O
Treat:
- Bed rest
- Blood pressure control
- Maintain glucose which is often low
- Lactulose to clear gut of ammonia producing bacteria

HELLP:
- 15% of all preeclampsia
- not a distinct entity
- diagnostic criteria AST>50, LDH>180, platelets <100
- modest elevations in indirect bilirubin
- AST usually < 10 times normal

Preeclampsia:
- Elevated LFT in 50%
- Fibrin deposition, thrombin deposition in the liver

AFLP not incariable, even if fetus is homozygote
Liver rupture:
1/45,000 pregnancies
maternal mortality 60%

Viral Hepatitis
Most common cause of jaundice in pregnancy
Overall, viral hepatitis show small inc in PTD, IUFD

Hep A
8  Fecal oral
9  4 week incubation
10 fall and winter
11 self limited
12 80% effectiveness of IG, and amelioration if given within 2 weeks of exposure
13 jaundice unlikely in neonates—usually mild infection
14 hold off on live vaccine for 3 mo

Hep E
- fecal oral
- Mexico, India, Russia
- Predilection for fulminant hepatitis with attack rates and mortality 10-20%
- IUFD common

Hep B
- 1-5% of population chronic carrier
- 10% of new cases become chronic carriers
- 1-2/1000 in pregnancy—acute
- HeBsAg detected in blood 2-8 weeks after exposure
- Anti-HbcAg detects window period—may be 2-16 weeks
- Chronic carrier-babies
- 90% of neonates become carriers
- lifetime risk of hepatocellular carcinoma—40%

Vertical transmission
- vertical accounts for 40% infection worldwide
- HbeAg---95% infection rate
- EAeg negative 25% infection rate
- Anti-HbeAg pos-12% infection rate
- Chronic carrier in neonate uncommon with
  - Acute infection
  - Mothers with anti-HbeAg
  - Mothers HbeAg neg---these babies more prone to fulminant hep than acute**

Prophylaxis
6. HB prophylaxis protects against D as well
7. Vertical transmission of S uncommon
8. HBIG 0.06 mg/kg given within 36 hours
9. Give vaccine at 0, 1, 6, mo
10. Prevents 85-95% of disease
11. May give interferon, nucleoside analogues for chronic disease

Hep C
- That and alcohol most common reasons for liver transplant
- Most common reason for liver cancer
- Usually disease is mild and unnoticed—-but chronic disease almost invariable—but long term outcome unpredictable
- Chronic disease does NOT equal death---only about 3% develop cirrhosis
- Vertical transmission 0-18% and is unlikely with viral load less than 1 million
- ??breastfeeding
- may treat with interferon alpha +ribivarin

Hep G
1. high risk groups like IV drug users
2. can cause acute and persistent infection

Other agents:
1. herpes simplex
2. cmv-most common cause of post transfusion hepatitis
3. EBV
4. AIDS

Autoimmune chronic hepatitis
- Hypergammaglobulinemia, antismooth muscle antibodies
- May patients young women
- Treat with predisone, azathioprine

Acute Liver failure
- Fulminant hepatic failure—hepatic encephalopathy within 8 weeks of symptoms
- Late onset->8 weeks
- PT most sensitive indicator of liver dysfunction
- In US, indeterminate is most common cause (non A thru E)
- Elevated wbc noted
- Give vit k and folate
- Give H2 blocker tp prevent GI bleed
- Give glucose because profound hypoglycemia common cause of maternal and fetal death
- Cerebral edema treated with mannitol if kidneys are functioning

Liver transplant
- Immunosuppression may worsen htn and inc risk of preeclampsia
- Preterm delivery common
• Drugs may also inc risk of cervical dysplasia
• Graft rejection may be less common with fulminant disease
• Complication of transplant most likely due to hemorrhage from delivery
• Close blood monitoring of drugs

Cirrhosis:
• Pregnancy unusual
• 10-18% death rate
• 25% IUFD
• esophageal variceal bleeding common
• 50% have successful pregnancies
• give vit K

Portal HTN:
• death from massive GI bleeding
• rupture of splenic artery aneurysm—approached via laparoscopic ligation
• 2/3 ruptures in 3rd tri
• full work up..esophagastroduodenoscopy
• bleeding varices can be controlled via endoscopic sclerosing

Primary biliary cirrhosis
• chronic liver disease of unknown etiology
• antimitochondrial antibodies
• elevated Alk phosph and GGT
• treat with Vit K, ursodiol…but no treatment to reverse disease

Wilson’s disease
• uncommon successful pregnancy
• Kayser-Fleischer rings—but also with prim bil cirrhosis
• Treat with D-penillamine (don’t give oral iron)

Budd-Chiari:
• 75% occurs in females
• 15% seems to occur postpartum
• obstruction of large hepatic veins produces obstruction, hepatic congestion, centrilobular necrosis, rapid abdominal distention and ascites
• management of disease disappointing, ascites tougher to treat, often need transplant

Sclerosing cholangitis:
• destruction of bile ducts resulting in cirrhosis and cholangiocarcinoma
• obscure etiology—assoc with HLA B8 and DR3
• 70% of patients have ulcerative colitis
• 5% have Crohn’s

porphyria cutanea tard most common porphyrin disorder in the west

Hepatic abscess:
• often mistaken for appy
• more common with immunosuppression
• may be caused by Listeria, Echinococcus

Gilbert’s—elevation in unconjugated bili
Dubin-Johnson—benign—conjugated
Rotor—conjugated

Polycystic liver disease—autosomal dominant, cystic kidneys as well

Gallbladder:
Chololithiasis:
- second most common surgical disease in pregnancy
- 1/1000 deliveries
- concurrent pancreatitis common
- surgery in 2nd trimester
- otherwise bedrest, npo, hydration, antibiotics

Pancreatitis:
- amylase inc during pregnancy
- pancreatitis 1/3800 deliveries
- elevated lipids in pregnancy may unmask a lipid disorder and cause pancreatitis
- may also be caused by steroids, hyperparathyroidism
- treat with tPN as need, NPO, hydration, correct electrolytes
- pregnancy possible after pancreas transplant---inc risk of hyn and pih secondary to immunosuppression

CHAPTER 58-RHEUMATOLGIC AND CONNECTIVE TISSUE DISORDERS
SLE
-Due to antigen-antibody complexes in serum or antibodies reacting to fixed tissue antigens
-Fertility not affected
-1/700 women, In afr am, 1/245
-pregnancy does not affect course of disease

Symptoms/signs:
- low grade fever
- rash
- RBC casts, protein, casts in urine
- CNS findings in 50%

Lab testing:
- ANA and anti-DS DNA. ANA neg in 2% of patients
- Tough to follow ESR, but value > 50 probably abnl…follow complement

SLE affects on pregnancy:
- Hypertension
- Renal compromise
- PPROM
- Congenital heart block
- If hypertension, renal impairment and APS absent, outcomes good, but sill 40% risk of PPROM
- High rate of pregnancy loss if Cr Cl <65 or creatinine >1.5

Neonatal Lupus:
- Hematologic—anemia, leukopenia, thrombocytopenia—usually mild
- Cardiac—1/20 risk of heart block if anti Ro or La, but 1/3 if previously affected child. If severe heart block---may treat with high dose dex—crosses placenta.
- Neonates with heart block also have 15% risk of structural anomalies
- Skin lesion—usually don’t have other problems if skin lesions

Management:
- Tylenol, aspirin
- Antimalarials—but theoretic risk of chorioretinitis
- Prednisone 30 mg day
- Azathioprine may be used (fear of chrom breaks) but cytoxan and mtx contraindicated
- Give above in stepwise fashion
If steroids were taken regularly for a month out of previous year, give stress steroids

Rheumatoid arthritis
12. 1/1500 pregnancies
13. affects synovial joints with lymphocytic and monocytic infiltration
14. HLA-D4 associated
15. Wrist, proximal finger joints, cervical vertebrae
16. 90% rheumatoid factor Ab—titer of 1:160 with symptoms diagnostic
17. improves about 70% of the time

Treat:
- tyelonol, ASA, indocin
- sulfasalazine second line
- may use steroids
- can't use gold—blood dyscrasias, or MTX

Ankylosing spondylitis:
3. starts sacroiliac
4. men>>women
5. no affect of pregnancy

Scleroderma:
5. skin, GI tract, kidneys, lungs
6. localized (skin) and diffuse form. Good prognosis in localized form
7. SCL-70, anticentromere Abs
8. Often see deterioration with hypertensive crisis
9. Captopril often used, but can't in pregnancy
10. Difficulty with bowel draw, epidural

Sjogrens Syndrome
- Lymphocutic infiltration of lacrimal and salivary glands

CHAPTER 59-NEUROLOGIC DISORDERS
Epilepsy
- Tegretol, dilantin, phenobarb may interfere with efficacy of oral contraceptives
- 0.5% of pregnant patients have epilepsy
- 45% of patients experience transient increase in seizures during pregnancy
- the better control (<1 per 9 mo) the better the outcome
- epilepsy may rarely occur during pregnancy for the first time, one quarter will have seizures only related to pregnancy
- folic acid lowers seizure threshold
- antacids and antihistamines affect anticonvulsant efficacy

Effect of epilepsy on pregnancy
- higher rate of stillbirth
- seizures may result in hypoxia
- offspring may have 2-3% risk of epilepsy (NOT true if father is epileptic)
- inc risk of cleft lip, palate, and cardiac

Carbamazepine:
Craniofacial defects, fingernail hypoplasia, development delay
Valproate—1-2% risk of ONTD
Trimethadione—up to 50% affected
Fetal hydantoin syndrome—11%, and 3 X more may have mild forms
IUGR, microcephaly, dysmorphic facies
Barbiturates—besides similar anomalies to hydantoin, associated with withdrawal symptoms
Anticonvulsants may result in neonate born with bleeding diathesis

Therapeutic recommendations:
- Don’t switch drugs while pregnant
- Try to avoid trimethadione and valproate
• Usually withhold medication unless pt has had TWO seizures, one of which has occurred when patient is nonpregnant
• Do MRI, EEG, blood tests
• If meds are started, generally continue until pt seizure free for 4 years
• Drug levels may need to be slowly increased, especially when blood levels decline by 30%

Headache:
Only a third of patients with brain tumors have headache

Tension: chronic, last all day, and are worse in evening
    Usually respond to mild tranquilizers

Migraine: in classic form, headache preceded by visual, sensory, or motor symptoms
    May have n/v photophobia
    60% of women with migraine link periodicity to menses
    usually improves (64%) after the first trimester
    treat with simple analgesics, possibly propranolol

Tumors: some tumors, such as meningioma, have sex steroid binding sites
    May deliver vaginally, but shorten 2nd stage

Pseudotumor: associated with pregnancy and oral contraceptives
    May have papilledema and Diplopia, from abducens weakness
    High dose steroids, diamox, lasix, lumbarperitoneal shunts

Arterial cerebrovascular disease:
• Accounts for 66% of nonhemorrhagic hemiplegia
• Usually occurs in third trimester
• Factors I VII, VIII, IX, X go up, prot &S go down

Venous occlusive disease
• More rare
• 3rd tri and PP
• CSF protein, cell count rbc may be up
• 30% mortality
• treat with heparin, mannitol, steroids

Subarachnoid:
• due to aneurysm in over half of patients
• angiomas second most likely
• both a bit more likely to bleed afterwards
• diagnose with CT
• must avoid standard practice of hypotension and hypothermia in pregnancy for surgical repair
• usually deliver by C/S

Polio:
Pregnancy may increase chance of infection and increase likelihood of muscle weakness

Tetanus: may occur as a result of delivery, 50% mortality. Neonates may get it from an infected cord
Listeria may cause neonatal meningitis
Vit B12—megaloblastic anemia, pyramidal myopathy

PKU:
• autosomal recessive—important cause of mental retardation
• women with PKU have a high rate of spontaneous abortion, miscarriage

Chorea—involuntary rapid muscle jerks
Chorea gravidarum:
- Syndenham’s chorea—likely caused by vasculitis from group A strep---when it happens during pregnancy call chorea gravidarum
- Most resolve PP, assoc wit rheumatic heart disease
- 20% may recur, in some causes no association with infection noted
- may be caused by estrogen containing OCP as well
- other causes of chorea include Huntington’s and SLE
- 10-20% of women also have restless leg syndrome—creeping sensation at night

Wilson’s Disease:
- autosomal recessive, chrom 13
- copper accumulates in brain, liver, other organs
- low serum copper and ceruloplasmin noted
- high rate of Sp Ab

Multiple sclerosis
- random plaques of demyelination
- tendency for remissions during pregnancy and exacerbations 3-6 mo PP
- MS does not shorten life, no inheritance in offspring, but tend sto occur in sibs

Spinal cord lesions:
- Lesions in early pregnancy may result in Sp Ab
- Bladder infections common
- Pressure sores common
- Lesions above T10—patinet cant feel pain of contractions---biut uterus contracts normally
- May consider induction in these cases so patine doesn’t deliver unexpected at home
- Leg spasms may be associated with contractions
- Lesions above T6 may be associated with autonomic Hyperreflexia—hypertension, bradycardia, sweating, vasodilation, piloerection above the level of the lesion---treat with reserpine---which depletes catecholamines from sympathetic nerve terminals
- Forceps delivery may be needed because of poor expulsive efforts

Peroneal nerve injury may sometimes be the result of compression fro the fetal head, causing foot drop

Carpal Tunnel
- first 3 digits and lateral border of the ring finger
- forearm pain and thenar atrophy
- Tinel’s sign—percuss wrist causing paresthesia
- Phelan’s—flex writs for one minute—also paresthesia
- Usually treat with splinting, followed by local injection of steroids, followed by surgery

Meralgia Paresthetica
Lateral femoral cutaneous: L2, L3
Obturator: L2,3,4—gait disturbance, adductor muscles—from lithotomy position
Femoral:L2,3,4 from excessive flexing
Bell’S Palsy: 7th nerve. In crate in pregnancy 45/100,00 compared to 17/100,000
Treat with steroids, 90% resolve
Wernicke’s: thiamine-hyperemesis

Guillan-Barre:
- Follows capmylobacter
- Inc prot in csf, but nl cell count
- No inc in preganancy
- Treat with plamapheresis if severe

Acute intermittent porphyria: inc porphobilinogen and delta-aminoleulic acid
- Colicky abdominal pain
- Polyneuropathy
- Sensitivity to light
- May be precipitated by barbiturates, sulfa drugs
- Pregnancy may cause exacerbations

Myasthenia:
- Reduced number of available acetylcholine receptors at neuromuscular junction
- More common in females
- Levator palpebrae affected
- Proximal muscle weakness
- May be associated with thymoma and may be treated with thymectomy
- May improve with neostigmine
- Antibodies to acetylcholine receptors
- No affect on pregnancy
- Avoid mag, muscle relaxants, general anesthesia
- 10-15% risk of neonatal disease

Myotonic dystrophy:
- dominant, inherited from mother, localized to trinucleotide repeat on chrom 19
- weakness of facial, neck, and distal limb muscles, mental retardation
- poly may develop from poor fetal swallowing
- uterus may contract poorly leading to hemorrhage
- avoid depolarizing relaxants, pts alos prone to arrhythmia

CHAPTER 60 - SKIN DISORDERS

Pigment
- hyperpigmentation may be the result of MSH
- melasma occurs in about 70% of pregnant women
- usually resolves, but may persist
- topical retin A may help
- pregnancy may induce or change appearance of nevi

Vascular changes:
- may increase telangiectasia (persistently dilated blood vessels)
- may increase spider angiomas
- may increase palmar erythema
- pyoenic granuloma may occur on gums

Connective tissue changes:
- stria: linear tears in dermal connective tissue—no known therapy (they don’t develop in Ehlers-Danlos)

Hair:
- anagen: growing phase of follicle—3-4 years
- catagen—transition phase of 2 weeks
- telogen—resting phase lasting several weeks---when hair is shed
  at any given time (nonpregnant) 10-15% of hair follicles in telogen
  In pregnancy, number of anagen hairs increases, and after delivery, number of telogen may increase to 35% of total—telogen effluvium

Pruritis gravidarum (1-2%)
- 3rd trimester onset
- may occur anywhere on the body—but NO rash
- severity correlates with bile acids
- may recur in 50% of pregnancies
- associated with lower birth weight, meconium…related to cholestasis
- treat with antihistamines
- Ursadiol

**PUPP (0.6%)**
- lesions begin on abdomen and spread to extremities, often sparing umbilicus and face
- papules and plaques
- perivascular infiltrate of lymphocytes noted
- may be an association with inc weight gain
- doesn’t recur
- no pregnancy sequelae
- antihistamines, topical emmollients

Prigo gestationis (0.3%)
- etiology unknown
- papules—mostly on extremities

**Pemphigoid Gestationis:**
(Herpes Gestationis)
- 1/50,000
- HLA B8 and DR3&4
- Vesicles and bullae beginning on abdomen, usually around umbilicus
- Perivascular lymphohistiocytic infiltrate with heavy C3 deposition in epidermal basement membrane
- Similar to bullous pemphigoid in geriatric patients, but anti-basement membrane antibodies not often detectable in serum
- Postpartum flares occur 50-75% of time
- 20-50% experience recurrence with OCP
- Neonatal mortality rate of 30%, increase in IUGR and PTD
- Prednisone to stop new blister formation

**Impetigo Herpetiformis:**
- Very rare
- Not related to infection—misnomer. Now thought to be related to generalized puscular psoriasis
- Subcorneal pustules of Kogoj-containing neutrophils and degenerated keratinocytes
- Hypoparathyroidism may be present
- Hundreds of translucent, white, sterile pustules, which extend peripherally while central lesions rupture
- Predilection for groin, axilla, gluteal crease
- Constitutional symptoms—fever, chills, nausea, diarrhea
- Systemic steroids

There is a phenomenon of autoimmune progesterone and estrogen dermatitis
Acne is a disease of the pilosebaceous unit partially influenced by androgens—may treat with benoyl peroxide or salicylic acid
Atopic dermatitis: 50% worsen, 24% improves—eczema
Erythema nodosum—tender nodules on the anterior lower legs, usually considered to be a reaction to a drug or infection. Associated with sarcoid and inflammatory bowel disease and may be precipitated by pregnancy

Fox-Fordyce: multiple dome shaped follicular papules---in apocrine areas such as axilla, anogential. Usually improves during pregnancy

**Genodermatoses:**
Icthyosiform erythroderma are divided into dominant and recessive forms
Epidermolysis bullosa—extensive skin blistering that may predispose to fluid loss, scarring and infection. Dystrophic and letalis forms may be distinguished based on basis of electron microscopy

CHAPTER 61-PELVIC MALIG, GTN, NON PELVIC CANCER

Cancer overall 1/1000 births
Most common
- Breast
- Leukemia & lymphoma
- Melanoma
- GYN cancers—most common

Cervical cancer:
- Most common invasive cancer in pregnancy
- 1/2500
- constitutes 25% of all malignancies
- delays occur because clinicians reluctant to do biopsies
- acetowhite areas with no vascular changes may be watched
- diagnosis of microinvasion must be followed by a cone—15% risk of bleeding complications, since squamocolumnar junction is everted, may o a coin size specimen
- If CIN I-III, may defer follow up until PP
- If microinvasion, may proceed to term, if frank invasion (>3 mm) need therapy in pregnancy (IA1)
- If between 3 and 5 mm invasion and less than 7 mm wide=la2—may wait, but do a radical after delivery
- Pregnancy does not seem to affect prognosis
- Up to 20 weeks: 4500 Rad whole pelvis radiation, this is usually followed by SAB, after which 6000 rad of brachytherapy given
- May also due modified radical hyst
- If later, cesarean radical hyst or radiation

Ovarian Ca:
- 2nd leading pelvic malignancy
- 1/25,000 pregnancies
- masses large enough to be a problem occur in 0.3% of pregnancies
- torsion occurs over all in 10-15% of these, usually between 8-16 weeks
- solid masses of any size, or mases larger than 8 cm…excise at 16 weeks. Other, smaller masses may be observed for about 6 weeks
- 50% of cancer is epithelial (serous, mucinous etc etc)
- germ cell (teratoma) most common benign mass
- even if malignant germ cell, may manage with unilateral oopherectomy
- highly malignant germ cell tumors like embryonal, endodermal sinus cannot wait until term—grow rapidly. Either terminate or treat with fetis in utero

GTN—review Board Review II
4 months, 40 weeks, brain or liver mets, failed single agent chemo.
Treat with MAC (mtc, actinomysin D, cyclophosphamide)

Cancer therapy in pregnancy:
Chemo
- may induce fetal leukopenia at term
- folic acid antagonists most teratogenic (cranial dysostosis, cerebral deformities, micrognathia)
- most chemotherapy does not affect fertility
- cytoxan, mtx, 5-fu for breast ca causes at least 53% Amenorrhea
- GnRh treatment may be protective

Radiation therapy
Timing:
0-11 days: all or none
11-56 days microcephaly, IUGR, spina bifida with doses as low as 4 Cgy (organ system formation)
after day 56 >50 cGy can cause microcephaly, mental retardation
small doses 3-5cGy may inc risk of cancer and leukemia
doses at ovaries between 600-2000 cGy may cause sterility

Melanoma
- One of the few cancers adversely affected during pregnancy
- 8% of cancers in pregnancy
- may be thicker at diagnosis
- metastasizes to fetus and placenta more often. Accounts for 50% of fetal mets and 30% of placental
Breast Ca:
- 1/3500 pregnancy
- larger primary tumor and higher incidence of + nodes at diagnosis during pregnancy
- FNA 95% sensitive
- Breast conserving surgery with radiation not recommended because of fetal doses may be as high as 100cGy
- May offer lumpectomy, axillary node dissection, and radiation following delivery
- Survival is poor for disease discovered in pregnancy because it is more advanced disease
- Strongly consider pregnancy termination in advanced cancer that is estrogen receptor + (this is NOT true for early disease)
- 30% of tumor ER +
- subsequent pregnancy does NOT inc risk of recurrence
- most surgeons discourage breastfeeding

Thyroid Ca:
- 65% of thyroid cancer are women
- 15% are below age 30
- 75% of discovered nodules are benign colloid nodules
- 15% of nodules malignant, BUT only 2% of cystic masses
- do sono, TFTs, FNA
- thyroidectomy ok during pregnancy

CHAPTER 62-PROBLEMS IN HIGH RISK NEONATES

Survival:
1996
20% at 23 weeks
50% at 24 weeks
70% at 25 weeks
1986 data--32 weeks---28% RDS, 1% grade 3&4 IVH, 5% NEC
28 weeks-- 80-% RDS, 3.6% IVH, 25%!! NEC
24 weeks—67% RDS, 25% IVH, 8% NEC
- IF APGAR LESS THAN 6 AT 5 minutes, do a 10 and 15 minute score
- Apgras at 1 and 5 minutes do not correlate well with outcome
- Apgar of 0-3 at 5 minute conveys only 1% risk of CP
- APGAR=
  - Heart rate
  - Respiration
  - Color
  - Muscle tone
  - Reflexes
    - Asphyxia=pH<7.00, AND Apgara 0-3, AND neurologic manifestation (seizure) AND multi-system organ dysfunction
    - IF FH <80 for prolonged period, consider chest compressions and intubation

Threshold of viability:
- Birthweight below 1 kg-0.4% of deliveries
- Below 750=0.2%
- Mortality of 24 week female 40%, male 60%
- Surfactant may not have great impact of morbidity <750 g and <25 weeks

Birth Injuries:
- Clavicular fracture-immobilize 7-10 days
- Erbs—C5&6, pronated limp arm
- Klumpke: C8-T1---no wrist or grasp movements, claw hand

RDS
- Exceeds 80% less than 27 weeks
- Decrease in lung compliance from surfactant deficiency leads to v/q mismatch, while high pressures lead to barotraumas.
  Cykines and oxidants may lead to chronic lung disease
- Need to maintain nurtional support for these neonates
- Maintain arterial PO2 at 50-80mm HG
- Surfactant protein B absence associated with RDS
No advantage to prophylactic surfactant
Risk of BPD unaffected by surfactant therapy
Inc risk of intraalveolar therapy in surfactant therapy
High frequency ventilation does not dec BPD, but MAY INC grade 3 & $ IVH

Apnea:
Theophylline and caffeine mainstay of therapy
If above fails --- CPAP

Cyanosis — hypoxia test --- if give 100% O2 for 10 min and PO2 doesn’t rise, then a right to left shunt is confirmed
90% of RV blood usually goes thru ductus
30% of neonates < 1500g have PDA
15% of preemies with RDS have PDA

IUGR/SGA
low birth weight accounts for 75% of poor perinatal outcome
few PRETERM infants who are SGA at birth catch up during neonatal period
if catch up — usually in the first year of life
at 3 yrs, 50% of SGA infants will have subnormal weight
most SGA have normal IQ, but increased laguage delay, scholl and behavioral problems

Blood disorders:
Anemia — Hb < 12 in first week of life
Polycythemia-crit > 65%
Hyperbilirubinemia -> 13 mg/dl. Light therapy makes bilirubin soluble
Breastfeeding association with high bili due to reduced calories

Neonatal seizures:
1-3/1000 births
- hypoxic 46%
- Infection 17%
- ICH 15%
- Infarction 6%
- Hypoglycemia 5%

Malformation:
2% overall -- severe
multifactorial 0.7%
mendelial 0.4%
chromos 0.2%
terat 0.1
unknown 0.6%

TE Fistula 1/300 births
- NG tube Coiled in esophagus
- most common 87% -- Esoph atresia with distal TE fistula

CHAPTER 63 - CEREBRAL PALSY
chronic disability characterized by aberrant control of movement or posture appearing early in life and not the result of recognized progressive disease
1.5-2.5/1000 births
50% of CP have IQ less than 70
30% have seizure
upper motor neuron: excessive tone hyperactive reflexes
lower motor neuron: fasciculation, atrophy, hypotonia

Types of CP:
- Spastic: most common, hypertonia… calsp knife rigidity. Usually due to cerebral cortex and pyramidal tract injury
- Dyskinetic: basal ganglia and extrapyramidal tracts. Athetoid movement. Usually from kernicterus—has decreased
- Ataxic: lack of balance
- Quadriplegia: all 4 limbs
- Diplegia: lower limbs
- One side or another: hemiplegia
- MRI reveals specific brain lesion 70% of the time
- Spastic diplegia—associated with prematurity—increasing
- Spastic quadriplegia—more closely associated with hypoxia

Demographics
- Extremes of reproductive age and parity
- Socioeconomic status, but not race
- Associated with SGA
- Infection—toxo and cmv, others
- Infection increases rate of ICH and PVL, hereby inc rate of CP
- Winkler(1991) only pH <7.0 associated with CP
- APGAR is a better predictor of gestational age than CP (the earlier the gest age th elower the score)
- ICH and PVL best predictors of CP
- TNF and IL-6 associated with inc rates of CP

CP:
- 23-25 weeks 25%
- 27-28 weeks 3% (15% PVL)
- 36 weeks .1%

- PVL peaks at 28 weeks, is 6.5% at 31 weeks
- ICH (grade 4) 40-80% risk of CP
- Infection and prematurity seem to be two main etiologies
- 15% likely due to hypoxia
- upt to 70% of VERY preterm birth may be associated with infection
- 50% of cases etiology is unknown
- CP may be reduced by 50% by steroid use

CHAPTER 64—ANESTHESIA CONSIDERATIONS

- Controversy as to effect of epidural on length of labor (Nageotte,1997) no diff
- Preeclampsia—may be a problem if preload is reduced, but if BP maintained, epidural may actually improve uteroplacental blood flow

- If platelets <100K, but bleeding time <12 min, probably safe to give epidural
- Magnesium potentaites the effects of neuromuscular relaxing agents
- In paraplegics, even if lesion is above T10, and no pain is felt, may want to give epidural to prevent autonomic hyporeflexia, especially if above T7
- Narcotics are bronchoconstrictors, use epidural in patients with asthma
- If general is needed in asthma, ketamine is
- drug of choice because it is a bronchodilator and doesn’t induce histamine release

Cardiac Disease:
- 50% inc in intravascular volume, 30% dec in SVR
- pain of labor may inc CO 50%
- each contraction causes autotransfusion of inc in CO of 25%

Rheumatic disease
- regurgitant lesions well tolerated but stenotic lesions are not

Mitral stenosis accounts for 90% of rheumatic disease in pregnancy
  - stenotic valve leads to fixed cardiac output due to limited filling
Aortic stenosis:
- rare
- concentric hypertrophy
- avoid both Tachycardia and bradycardia
- keep wet
- transvalvular gradient should be less than 50mm Hg and valve surface area > 1cm, otherwise, Swan
- may use carefully titrated epidural

Mitral insufficiency
- second most prevalent valvular disease in pregnancy
- inc risk of afib
- inc in SVR may lead to increase in regurg
- may use epidural

Aortic insufficiency
- again, avoid inc in SVR
- avoid brady, which inc time of regurg
- may use epidural

Left to right shunts: may use careful epidural
ASD is one of the most common congenital cardiac lesions

Right to Left shunt:
Eisenmengers:
Strict definition**: reversal of a left to right shunt, usually due to a VSD, with pul HTN
- avoid hypotension…cautious use of epidural, use Swan

Tetralogy: most common cause of right to left shunt in reproductive age
Poor prognosis
- polycythemia
- pO2 <80
- right ventricular hypertrophy

With both of above, general agents may be most safe, because dec in SVR increases shunt

Primary pulm HTN:
- very sensitive to changes in RV volume
- may be best managed with IV narcotic and Swan, but may consider careful epidural

Prev MI
- avoid valsalva
- epidural method of choice

IHSS
- beta blocker—sensitive to Tachycardia
- maintain preload with adequate hydration
- avoid valsalva, which abruptly inc preload
- pregnancy: inc in preload good, inc in HR deleterious

Scoliosis
- 0.5% of population
- may have pulmonary compromise, so epidural method of choice
**Achondroplasia**

- poor airway
- apnea and compromised PFTs
- cor pulmonale with restrictive lung disease
- compressed spinal canal and hypoplastic intervertebral disks may make epidural difficult
- drugs may spread unpredictably, and less is often needed