

Problem-Based Clinical Cases

**Obstetrics and Gynecology Rotation
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Section I: General Gynecology

4. Breast Disorders: 49 year-old Jean, G3 P2 Ab1, presents at your office complaining of a left breast lump. Your examination confirms a right breast upper outer quadrant 3 cm discrete, nontender, cystic mass.

DDX:

1. Fibrocystic DZ
 - Most Common Breast Disease
 - Tender with hyperplastic changes
 - due to decreased progesterone or increased estrogen
 - Get a mammogram to rule out cancer
 - FNA to help in diagnosis
 - Provera, Tamoxifen, Paclodol to treat, diuretic to decrease edema
2. Fibroadenoma
 - Most Common Benign Tumor
 - Well circumscribed and freely moveable
 - increased with pregnancy; regress with menopause
 - Treatment involves surgical excision
 - Usually found in females < 30
3. Intraductal papilloma
 - usually develops just before or during menopause
 - presents with bloody discharge
 - excisional biopsy of involved duct
4. Mammary duct ectasia (Comedomastitis, Plasma Cell Mastitis)
 - Common in 40's
 - presents with nipple discharge
 - presents with pain and tenderness (due to dilation of the ducts)
 - chronic intraductal and periductal inflammation
5. Galactocele
 - Ductal obstruction
 - milky thick discharge
6. Carcinoma
 - 90% ductal; 10% lobular (often bilateral)
 - Paget's 3% arises in secretory ducts and skin of the areola
 - PM women have a greater chance of being hormone receptor + which is associates with a better prognosis
 - most important prognosticator is axillary node involvement
 - Rx with sx, chemo, and hormonal rx if HR+

HX:

- Nipple discharge
- family history
- age at menarche
- age at menopause
- dietary fat intake
- history of irradiation

Risk Factors for Breast Cancer

- Positive family history in a first degree relative
- Nulliparity / early first birth
- Early menarche
- Late menopause
- Age > 40
- Prolonged unopposed estrogen
- Increased dietary fat intake

History of ovarian /endometrial CA
 History of irradiation
 Fibrocystic changes with cellular atypia

PE:

- Nipple retraction
- skin dimpling
- lymph node exam
- look for erythema and edema
- is it fixed or movable
- is it solid or cystic

LABS:

- Hormone receptor assay
- mammogram

Prevention and Screening:

Instruct patient on self exam
 Analysis of risk factors
 Mammography : Primary Screen at 35yo; Every other year btwn 40-50yo; every year >50yo

5. Contraception: 16-year-old Lisa, G1 P0 Ab1, presents at your office requesting an intra-uterine contraceptive device.

Types of Contraceptives:

- 2.) Intrauterine(5%)
- 3.) Barrier(10-15%)
- 4.) Chemical(15-20%) percentages are failure rates
- 5.) Physiologic
- 6.) Sterilization(4%)

Mechanism of Action:

1. Hormonal contraception involves the use of estrogen and progesterone to prevent fertilization; associated with a 2-3% failure rate. Oral contraceptive pills suppress the action of FSH/LH from pituitary gland, they also suppress the LH surge, alter the cervical mucosa to inhibit penetration by spermatozoa, and they inhibit atrophic change in the endometrium.
 - A. Complications: venous thrombosis, pulmonary embolism, CVA, MI, HTN, amenorrheacholilithiasis, hepatocellular adenoma. Risks increase with smoking.
 - B. Contraindications: DVT, PE, CVD, CVA, pregnancy, cancer, abnormal LFTs
 - C. Types:
 - Monophasic (fixed combination): take E & P on days 1-21 and placebo on days 22-28. Increased estrogen increases the side effects of headache, weight gain, nausea, and edema Decreased estrogen and progesterone increases the risk of breakthrough bleeding and increases the failure rate.
 - Multiphasic: Low dose estrogen with varying doses of progesterone on days 1-21.
 - Progestin only pills: Not as effective and can cause breakthrough bleeding.
 - Norplant: Lasts up to five years.
 - Depo-provera: Lasts three months.
 - D. Benefits: Decreases the risk of ovarian and endometrial cancer and decreased risk of ectopic pregnancy.
2. Intrauterine contraception involves the insertion of a small device into uterus with the hopes of inhibiting implantation, altering tubal motility, or inflaming the endometrium. Intrauterine contraceptive devices are associated with a relatively low failure rate (2-4% pregnancy rate) but do suffer from a higher rate of complications (e.g., a four times increased risk of ectopic pregnancy).
 - A. Types: both inhibit implantation
 - Progestaserts release progesterone and must be replaced annually.
 - Paraguard contains copper and can last up to 4-6 years

- B. Side effects: increased blood loss and duration of menses, increased dysmenorrhea
 - C. Complications: Expulsion of IUD, pregnancy, perforation of uterine wall when inserted, increased risk of tubo-ovarian abscess(esp. among younger nulliparous females with >1 sex partner). PID is not as common with the newer IUDs but still a significant risk factor.
 - D. Indicated for: multiparous women >35 years who smoke.
3. Barrier methods involve the use of an artificial device to inserted into the vagina or fitted to the penis with the intent to retain the products of intercourse.
- Types:
- Condoms have a 2% failure rate in consistent couples and a 10% failure rate in occasional users. They are best indicated for STD prevention.
 - Vaginal diaphragms have a 15-20% failure rate , but when combined with a spermicidal jelly and left in for 6-8 hours post-coitus failure rate declines to 2%. Diaphragms are associated with side effects of bladder irritation and cystitis, also colonization with *S. aureus* if left in too long.
 - Cervical caps must be properly fitted and can be left in for a longer time than the diaphragm.
4. Chemical contraception has a 15- 20% failure rate and involves the use of sponges and spermicides. Spermicides contain surfactants to disrupt cervical membranes; placed in the vagina up to 30 minutes before intercourse.
5. Physiologic contraception involves the avoidance of intercourse from onset of menses to 2-days post ovulation.
6. Sterilization involves manipulation of parts of male and female anatomy such that conception is prevented by failure and gametes to combine.
- Vasectomy: <1% failure and can be successfully reversed in some cases.
 - Tubal ligation: <1% failure rate. Increase risk of ectopic.

Management:

Concerns about pelvic infections and subsequent fertility often limit the use of IUCDs to women who are at low risk for sexually transmitted disease and to those less likely to desire further children, i.e., monogamous multigravid patients. Since this patient is a young female with no living children, *an IUCD is probably not a good choice for her*. She should be counseled about other birth control options, such as hormonal methods, as well as possible consequences of risky sexual behavior.

7. Dysmenorrhea: 28 year-old Martha, G2 P1 Ab 1, comes to your office complaining of severe pain with her menstrual periods for past 7 months. She had not had pain such as this previous.

Definition: painful cyclic period characterized by abdominal cramping occurring just before or during the menses. Affects 50% of women, 10% require bedrest.

Pathophysiology: Dysmenorrhea can be primary or secondary

1. Primary usually appears within 6-12 months of menarche (duration is 48-72 hours) and is thought to be physiologic in origin. Females with this condition have increased uterine activity manifest by increase resting tone, increase contractility, and increased frequency of contractions. It is thought to be caused by increased prostaglandin release during ovulatory cycles. The prostaglandin is released as a consequence of endometrial lysis and females with dysmenorrhea have increased PG2 α and PGE $_2$. Young teens, who tend to be anovulatory for the first few years after menarche, may eventually develop dysmenorrhea as they start to ovulate.
2. Secondary is painful menstruation that starts well after ovulatory cycles have begun, typically after the age of 20 sometimes as late as 30s or 40s and the pain is not limited to menses. The underlying pathologic mechanism is not well understood, but may involve PGs. Several disease processes cause secondary dysmenorrhea with endometriosis the most common. Usually associated with secondary dysmenorrhea are dyspareunia, infertility, and abnormal bleeding.

Differential Diagnosis:

Endometriosis- pain extends premenstrual or postmenstrual phase and may be continuous; ovary #1 location then cul-de-sac, then peritoneum

Adenomyosis- menorrhagia is associated with secondary amenorrhea

Fibroids-uterus is generally enlarged

Polyps

PID-initially pain is menstrual, but with each cycle extends to premenstrual; pelvic tenderness, and dyspareunia (Intermenstrual bleeding)

Ovarian Cyst

IUD questionable association with PID

Psychogenic

Cervical stenosis

Endometrial CA

TB

Irritable Bowel Syndrome

Anatomic anomaly

Ectopic pregnancy

Intrauterine adhesions

Pelvic Congestion Syndrome - pain relieved by menses

History:

Describe the pain: It is usually cramp-like, strongest over the lower abdomen and radiating to the lower back and inner thigh. The timing is an onset usually within 2 years of menarche for primary amenorrhea and later in life for secondary amenorrhea. The duration of the pain lasts for a few hours before or just after the onset of menstruation and lasts 8-72 hours. The pain can occur with sexual intercourse.

Interference with daily routine

Associated symptoms: Nausea, vomiting, headache, bloating, fatigue, diarrhea, low back pain, and dysuria

Menstrual history: Age at menarche, the regularity of the cycles, the amount and duration of flow

Meds tried

Sexual history with contraceptive history

Family history

In the above history the woman describes secondary amenorrhea based on her age, and the recent onset of this pain only seven months ago. A sexual history, family history, and contraceptive history would be important as well as PE to ascertain which of the underlying disease processes this lady may have.

Physical Exam:

After a complete physical exam the focus is the pelvic exam. Be sure to check for uterine tenderness, enlarged ovaries, fixation of the uterus, tender uterosacral nodularity (sign of endometriosis) cervical stenosis, and perform a bimanual and rectal exam noting any masses. Note the PE in primary amenorrhea is usually normal. In secondary amenorrhea, the underlying disease process can manifest on PE.

Work-Up:

Pregnancy test (all women of child bearing years)

Pap smear

Urine and cervical cultures to r/o infection

Consider endometrial biopsy

US

Laparoscopy

Management:

Primary dysmenorrhea:

Reassurance and explanation

NSAIDs

OCPs

Progestogens
 Tocolytics
 Analgesics
 Surgical Measures (avoid)
 D&C
 Presacral neurectomy
 Uterosacral ligament section
 Psychotherapy
 Hypnotherapy
 Transcutaneous nerve stimulation

Secondary Dysmenorrhea:

Treat the underlying disease process:

1. Endometriosis: ultimate treatment is complete removal of uterus and both ovaries followed by hormone replacement therapy (HRT). OCPs are of benefit in women of childbearing age to suppress the spread and inhibit the worsening of endometriosis. GnRH analogs, Lupron and Synarel are potent and cause lesions to shrink or disappear, but the disease returns when the drugs are stopped. Finally, laser or electrocauterization of the endometrial implants via laparoscopy is palliative.
2. Adenomyosis: ultimate treatment is total abdominal or vaginal hysterectomy with preservation of the ovaries if the patient is <45 years of age. Any menorrhagia should be investigated by fractional D&C to r/o endometrial CA. Otherwise treatment is palliative and if the dysmenorrhea is disabling, a GnRH agonist may provide relief.
3. Fibroids: prudent observation, myomectomy, or GnRH agonists. If no fertility is desired, hysterectomy.
4. Ovarian Cysts: If patient is of reproductive years and adnexal cyst is <6cm in diameter wait and examine patient again after next menses. OCPs may be beneficial to suppress gonadotropin levels. If the cyst is 6-8 cm or it is fixed or feels solid, pelvic US to ensure it is unilocular. If mass is >8 cm painful, multilocular, or partially solid, surgical exploration via laparotomy.

8. Dyspareunia: 26 yo Judy, G2P1Ab1, presents to your office complaining of painful intercourse

Definition: pain during sexual intercourse, may be deep pain or pain at the introitus

Differential Diagnosis:

1. Vulvovaginitis
2. Endometriosis
3. Vaginismus
4. Incompletely stretched hymen
5. Insufficient vaginal lubrication
6. Vaginal Atrophy
7. Infections
8. Neoplastic conditions
9. Idiopathic
10. Adenexal mass
11. Adhesions

History:

1. Onset, duration and nature of pain.
 - a. chronic problems may point to vaginismus or hymenal problems
 - b. pain for 48 hours following intercourse may be due to HPV
 - c. pain with deep penetration may be due to endometriosis or adenexal mass
2. Presence of vaginal discharge, itching, burning or spotting may establish vaginitis or cervicitis as possible cause
3. Previous similar episode that resolved with or without treatment - recurrent problem as with HSV or UTI

4. History of dysmenorrhea as with endometriosis
5. Any additional discomfort associated with the pain as with pelvic congestion or adenexal mass
6. Prior History of PID or pelvic surgery - possibly causing adhesions
7. History of sexual assault or abuse - possible cause of vaginismus

Physical: A careful pelvic exam should follow inspection of the external genitalia.

1. Note should be made of the most painful areas of stimuli.
2. Palpation of the posterior cul-de-sac and uterosacral ligaments
3. Visualization of the cervix is necessary.
4. Palpation for uteral and adenexal tenderness or masses is also included.

Lab Workup: Procedures to consider:

Cervical Cx or Bx
 Endometrial Bx
 Wet prep
 KOH prep
 Cx of superficial skin lesions HSV
 Vulvar/vaginal Bx of lesions
 Urine C&S

DDX and Management:

1. Vulvovaginitis - the big three - present with pruritis and d/c
 Trichomonas
 Candidiasis
 Bacterial Vaginosis
 Treat with appropriate abx or antifungal
2. Endometriosis
 Etiology- Endometrial glands and stroma outside the endometrial cavity
 Common Sites:
 Ovary (60% of cases will have ovarian involvement)
 Broad Ligament
 Cul-de-sac or peritoneal surfaces
 Uterosacral ligaments
 Posterior cervix
 Rectovaginal septum

Frequently seen in:
 rectosigmoid colon
 Appendix
 Vesicouterine fold

Occasionally seen in: Laparotomy or CS scars

Epidemiology: Occurs in 15% of women. Begins in the 20's, becomes apparent in the 30's and regresses after menopause. If seen in children or adolescents, look for obstructive genital anomalies.

Theories of Pathogenesis:

Halban theory- lymphatic spread; 20% of pts will have lymphatic involvement
 Meyer theory- Mullerian metaplasia theory: Peritoneal mesothelium under goes metaplasia to transform into endometrial tissue under influence of a yet unidentified stimuli.

Sampson Theory- Retrograde menstrual flow with Endometrial fragments implanting on the ovaries or peritoneal surfaces where they adhere and grow. [Recall that Sampson's artery runs through the round ligament]

Symptoms: The classic triad -**Dysmenorrhea**, **Dyapareunia**, **Dyschezia**

On pelvic exam the posterior fornix, uterosacral ligaments and cul-de-sac are very tender.

Classic physical findings are - Tender nodule of the cul-de-sac or tender adenexal mass
 uterosacral "barb" = sine qua non

Pre and post menstrual spotting is characteristic.

Menorrhagia is not seen - menstrual bleeding will usually diminish with endometriosis.

Infertility - not well understood but 30-40% of couples will be infertile if the female has endometriosis.

Dx - Laparoscopy definitive.

Treatment:

Large lesions - (6 -20 cm) Surgical resection.

Small lesions:

If asymptomatic observe every 6 mos.

If symptomatic:

1) Provera or OCP's

2) Danazol for 6-9 mos (if fertility not a problem) causes pseudomenopause with androgenic SE

3) GnRH agonist (Depot Lupron) Shuts down cycle without androgenic SE

3. Vaginismus - Voluntary or involuntary contraction of muscles around introitus.

Usually a result of

Fear, pain

Sexual trauma

Negative social attitudes towards sex as a child.

Dx by careful sexual history and interview

TX - sexual counseling and education, use of self-dilation with dilators of increasing diameter, patient must be in control of progressive steps.

4. Incompletely stretched hymen

Rare instances may require manual dilation, general anesthesia

Pt will complain of painful intercourse from initial event to present

5. Insufficient Vaginal Lubrication

Possibly due to :

Inadequate time for sexual arousal

Low estrogen effect during lactation

Post menopausal change

Physical examination of introitus and vagina will demonstrate estrogen effect. If estrogen is present the vaginal mucosa appears moist, healthy with rugal folds; If estrogen is low or absent the vaginal mucosa is dry, there are few rugal folds, and a thinned reddened epithelium is present.

Tx: Allow sufficient time for sexual arousal if estrogen is present, otherwise estrogen cream or testosterone cream may be helpful.

6. Vaginal Atrophy (due to estrogen)

See above

7. Infectious process other than Vulvovaginitis

Acute or chronic cervicitis

Acute or chronic endometriosis

Adenexal abscess, tubal abscess (salpingitis)

Chronic PID resulting in pelvic adhesions or uterine incarceration within the pelvis

HPV - Initial burning followed by 24-48 hours of a burning sensation. Look for lesions

Tx: Treat of infectious process and temporary abstention from coitus will usually resolve pain.

Surgical extirpation may be necessary if due to adhesions.

8. Neoplastic conditions

Ovarian cancer will often give a sense of fullness with dyspareunia

Vaginal and vulvar cancers can be painful.

Fibroids can cause dyspareunia if they have resulted in the incarceration of the uterus within the pelvis.

9. Idiopathic - No other observable causes (Psychosexual conflicts? History of Child abuse?)

Dx: Colposcopy of painful region with bx taken of any suspicious lesion (R/O HPV) Dx by exclusion is often the case

Tx: Supportive discussions and counseling - resolution of conflicts

9. Ectopic Pregnancy: 17 year-old Raquel, G2 P0 Ab2, is seen in the ER for unilateral pelvic and left lower abdominal pain. She admits to recent vaginal bleeding. She is afebrile. Qualitative serum beta-HCG is positive.

Definition: any pregnancy that implants outside of the uterus; this condition significantly jeopardizes the mother and is incompatible with continuing the pregnancy. It is the second leading cause of maternal mortality in the US. #1 cause of 1st trimester maternal mortality. 1/200 pregnancies

Pathophysiology:

- (i) caused by either altered tubal transport w/in damaged endosalpinx or an abnormal fertilized ovum.
- (ii) >95% implant inside the tubes (78% in the ampulla, 12% in the isthmus).
- (iii) catastrophic bleeding may occur when the implanting pregnancy erodes into blood vessels or ruptures through structures. Pregnancy expelled from tube can implant in the abdominal cavity.

Differential Dx:

GYN associated--

- (i) threatened/incomplete abortion
- (ii) ruptured corpus luteum cyst
- (iii) acute PID
- (iv) adnexal torsion
- (v) degenerating leiomyoma

Other causes--appendicitis, pyelonephritis, pancreatitis, gastroenteritis

History/Risk factors: The classic triad for presentation is amenorrhea, abd pain, and vaginal bleeding. Other presenting sx include syncope, dizziness, nausea, and pregnancy symptoms.

Risk factors—

- (i) salpingitis/PID (6-fold increase)
- (ii) previous ectopic pregnancy (10-fold increase)
- (iii) age greater than 35 (3-fold increase)
- (iv) greater than 50% occur in women who have had 3 or more pregnancies
- (v) Black and Hispanic women have a higher incidence
- (vi) h/o tubal sterilization; tubal reconstruction, several induced abortions, DES exposure

Sterilization, contraception, and abortion do not increase risk. The higher rate of PID in women who use IUD's may increase risk even after discontinuing use.

Work up/Therapy:

If there is a high clinical suspicion of ectopic pregnancy and the patient is hemodynamically unstable, they should be taken to surgery for an immediate laparotomy vs. laparoscopy. Patients usually stabilized by (?). The stable patient should have urine and serum qualitative and quantitative HCG levels drawn, with negative results ruling out the dx. If the quants come back <1500-2000, they should be redrawn in 48hrs along with a transvaginal u/s. If the patient is stable and if the levels double, an IUP is suggested. Quants above 1500-2000 call for a transvaginal u/s to visualize an IUP.

*In patients with quants between 1500-2000, no visualization of IU sac by u/s carries a 90% likelihood of an ectopic pregnancy.

*Rhogam should be administered to Rh neg. Patients.

10. Enlarged uterus: 31 year old Judy, G3 P3, comes to your office for a routine annual exam. On pelvic examination you find her uterus is enlarged.

Differential Diagnosis:

Most likely causes--

1. pregnancy --don't miss this one, it will make you look bad
2. fibroids (uterine leiomyomas)--benign smooth muscle tumor of uterus
-seen in 20% of women by 40y.o.a.

- most common indication for major surgery in women
 - blacks > whites
 - estrogen dependent (often shrinks after menopause) will calcify "womb stones" ; will row with pregnancy, OCP use and HRT
 - increased risk of endometrial CA 4X
 - most are asymptomatic, but pts. may experience pain, menorrhagia, urgency, constipation, anemia, and CHF (blood loss)
 - usually in midline
 - 3. uterine leiomyosarcoma--rare
 - 4. endometrial hyperplasia
 - usually secondary to increased estrogen or obesity
 - can be cystic glandular or adenomatous
 - often accompanied by abnormal uterine bleeding (AUB), heavy enough to include clots
 - 5. endometrial CA--the most common GYN malignancy
 - median age=60
 - usually assoc. with AUB, esp. postmenopausal bleeding
 - uterus may be nl. size; 75% are adenoCA
 - risk factors: obesity, nulliparity, late menopause, HTN, DM, Cholecystitis/cholelithiasis, breast CA, colon CA, ovarian CA, chronic unopposed estrogen
 - 6. adenomyosis-- thickened myometrium contains endometrial glands and stroma
 - 7. hematocolpos/hematometria-obstruction of menstrual outflow due to imperforate hymen, cervical/vaginal stenosis
- Other things that could be mistaken for uterine enlargement--
8. tuboovarian abscess
 9. ovarian neoplasm
 10. colorectal CA or other colorectal pathology

History:

- Menstrual history, contraceptive history, focusing on dysmenorrhea, menorrhagia, metrorrhagia.
 Does patient pass clots?
 Abdominal or pelvic pain?
 Feeling of fullness or heaviness in abdomen/pelvis?
 Dyspareunia?
 Urinary troubles/defecation troubles?
 Weight change?
 Decrease in energy level?
 Family history?
 Meds?

Physical Exam:

- Pelvic exam--20 week mass is at the level of the umbilicus
 General--look for anemia, signs of CA i.e. cachexia

Workup:

1. H & P
2. CBC, UA, hemocult, urine hCG
3. KUB/ pelvic ultrasound
4. Endometrial bx.
5. Exploratory laparotomy if diagnosis still unclear

Management:

1. Observation for fibroids unless: AUB leads to anemia, severe pelvic pain, unable to evaluate adnexa, urinary tract/GI tract symptoms, increased size in uterus after menopause, rapid increase in size of uterus, infertility. (Twenty week size, if symptomatic, would not be observed)

2. Medical: Fibroids and endometriosis can be treated with OCP's/progestins, Danazol, or GnRH agonists. Endometrial hyperplasia can be treated with cyclic progestins for 3-6 months and then repeat endometrial bx.
3. Surgical: TAH or TVH. Myomectomy can be performed for fibroids and adenomyosis if fertility is desired.

19. Menorrhagia: 32 year old Faith, G4 P4, presents at your office complaining of menstrual periods that last 14 days. Her cycles are irregular.

Definition: Menorrhagia is bleeding that is excessive in both *amount* and *duration* at regular intervals. However, a more precise definition would be Menometrorrhagia: bleeding that is excessive in amount, is prolonged in duration, and may occur at regular or irregular intervals. Defined as >7d duration, <21d cycle, >80mls of blood loss

Pathophysiology:

Dysfunctional uterine bleeding describes the occurrence of abnormal uterine bleeding for which an organic cause (i.e. fibroids) cannot be found. This diagnosis can be made only by excluding any pathology both by examination and by diagnostic curettage. It may, however, be impossible to exclude some types of benign organic disease.

Adenomyosis is associated with invasion of the myometrium by endometrial glands and may cause menorrhagia and dysmenorrhea, but is not associated with any histological abnormality of the endometrium.

There are two types of dysfunctional uterine hemorrhage:

- 1) **Ovulatory dysfunctional hemorrhage:** The pattern of the menstrual cycle and menstrual loss may be altered by defects of the corpus luteum or shortening of the follicular phase of development. Factors which affect the pituitary-ovarian axis will alter the periodicity of the menstrual cycle. The follicular phase is shortened, but the luteal phase remains the same. Abnormalities of menstrual loss may occur on a regular cyclical basis. The number of days of bleeding may remain constant and the loss become heavy or the number of days of bleeding may become prolonged. This can be caused by defective corpus luteum formation or defective degeneration of the corpus luteum.
- 2) **Anovulatory dysfunctional hemorrhage:** Most commonly occurs around the time of menopause. The persistence of an unruptured follicular cyst in one ovary results in excessive estrogen production causing the endometrium to become greatly thickened and when it can no longer be sustained by the continuing high levels of estrogen, it eventually breaks down in a patchy fashion. Sometimes long periods of anovulation can predispose to cystic or adenomatous hyperplasia.

Differential Diagnosis:

PREGNANCY (i.e., ectopic)
 adnexal pathology
 leiomyomata, endometrial polyps
 adenomyosis
 infection (endometritis)
 endocrine pathology (i.e., Stein-Leventhal syndrome/ Polycystic ovary syndrome- tonic estrogen production in the absence of ovulation and progesterone secretion; hyperthyroidism; myxoedema; Cushing's disease)
 coagulation disorder

History: What is her menstrual history? (regular, irregular) Amount of blood loss and when blood loss occurs (i.e. more in the beginning of the period or more near the end of the period)? Are menstrual bleeding preceded by breast tenderness, bloating, and pelvic tenderness (normal ovulatory fxn)? History consistent with STD (infectious cause of bleeding)? Sexually active?

Physical Exam: Check for the presence of normal female anatomy and signs of pregnancy. Uterine tenderness and signs of infection. Check for signs of hirsutism and signs of androgen excess (indicative of endocrinopathy).

Workup:

1. hCG level to rule out pregnancy
2. Pelvic exam: when uterine or adnexal pathology is suspected - confirmation through ultrasound. The sonographic characteristics of the mass are useful in determining the appropriate diagnostic testing/therapy. (i.e. CA-125, surgical exploration and histological diagnosis, CT/MRI)
3. When the pelvic exam does not clarify diagnosis- determine whether abnormal uterine bleeding is associated with ovulatory cycles (from history, if not apparent then obtain basal body temp. graph, determination of serum progesterone concentration, and endometrial biopsy).
4. If not associated with ovulatory cycles, consider endocrine disturbance- tests of thyroid, hypothalamic, pituitary, and adrenal fxn. Obtain serum FSH, TSH, prolactin, dehydroepiandrosterone and rarely .
5. Rule out infection- cultures for GC and Chlamydia trachomatis
6. Endometrial biopsy- most specific and sensitive test for determining the presence of endometritis.
7. If no causative agent/pathology found then consider subtle anatomic lesions- diagnostic hysteroscopy, hysterosalpingography, transvaginal U/S, etc.
8. A thorough evaluation may be completed without identifying a specific cause of abnormal uterine bleeding. In these cases, a coagulation disorder should be ruled out by obtaining PT, PTT, bleeding time, and platelet count.
9. The symptoms of uterine bleeding may be secondary to adenomyosis- a diagnosis made by exclusion or at the time of hysterectomy.

Management:

1. If anovulation and a proliferative endometrium is present, therapy must be preceded by an endometrial biopsy. In the absence of hyperplasia or neoplasia, cyclic progestins (10 mg of medroxyprogesterone) administered 12 days out of a month is usually successful. Oral contraceptives are a convenient substitute.
2. If the endometrial biopsy reveals simple or complex hyperplasia without atypia, progesterone withdrawal after 10 days of treatment should be followed by 10 to 20 mg of medroxyprogesterone daily for 2-3 months.
3. If biopsy reveals cytological atypia, hysterectomy is recommended since these lesions are likely to progress to adenocarcinoma. If adenocarcinoma is identified, complete staging followed by total abdominal hysterectomy followed by bilateral salpingo-oophorectomy are warranted

4. If leiomyomata- may be treated by medical management, hysterectomy (if fertility is not an issue) or laparotomy with myomectomy.
5. If endocrinopathy, infection, or coagulation disorder- primary disorder must be treated first (i.e., hormonal treatment, antibiotics, etc.)

23. Pelvic Relaxation: 55 yo Amanda G5 P4014 c/o pelvic pressure symptoms. On exam you note her cervix is protruding from her vagina.

Pathophysiology:

Amount--

Primary: descent limited to upper 2/3 of vagina

Secondary: structure reaches introitus

Tertiary: prolapse through introitus

3 kinds of prolapse: Enterocele(bowel herniation at top of vagina), Cystocele, Rectocele
- usually follows easy rather than difficult labor

Differential Diagnosis:

1. endopelvic fascia damage (cardinal ligament, uterosacral ligaments) causing uterine prolapse
2. pelvic floor damage (levator ani muscles)
3. increased abdominal pressure
4. sacral/diabetic neuropathy
5. chronic cough--(smokers)
6. congenital damage/intrinsic weakness
7. multiparity

History:

Does pt. experience heaviness or pressure?

Is it worse late in day, after lifting, while standing?

Back pain?

Dyspareunia?

Urinary incontinence?

Dyschezia?

Difficulty emptying bladder?

Physical Exam:

Observe as patient strains (Valsalva), use a Sims speculum (1 blade). It may be necessary to examine the patient while she stands and strains.

Treatment:

1. Mechanical support (pessary)--if pt. is unfit for surgery or pregnant
2. exercises to strengthen musculature "Kegel" exercises
3. Surgical repair
4. Estrogen replacement if post-menopausal
5. Also, wt reduction, rx chronic cough, infection, evaluate medications as potential causes

25. Postmenopausal Bleeding: 58 year-old Minnie, G5 P3 Ab2, underwent menopause 7 years ago. She comes to your office complaining of vaginal bleeding for one week.

Definition: Bleeding 6 months after cessation of menses (often associated with genital malignancies.)

Differential Diagnosis:

Exogenous estrogen	30%
atrophic endometritis/vaginitis.....	30
endometrial cancer.....	15
endometrial or cervical polyps.....	10
endometrial hyperplasia	5

misc.(cervical ca, uterine sarcoma, urethral caruncle,
trauma, fallopian tube ca)..... 10

History: Important questions to ask--

Number of episodes of bleeding (single episode of spotting is less likely to be malignant, but still must evaluate thoroughly)

Amount of bleeding

Associated discharge

Pain

Recent sex

Other associated symptoms

Current meds

Physical Exam:

abdominal exam - check for masses

pelvic exam - look for any visible lesions esp. exophytic, friable, or bleeding ones, uterine size may be normal

You now need to do the following:

- i) Pap - checking for cervical ca (#1 symptoms are postcoital bleeding and abnormal uterine bleeding, then see later development of other symptoms of local spread.) Pap will detect some stages of endometrial CA but not a reliable screening test.
- ii) Endocervical curettage for high risk pts
- iii) Endometrial Bx and possibly D&C - (#1 symptom of endometrial CA is Abnormal bleeding and 90% of victims have abnormal bleeding)

Management:

1. If malignancy is found, refer to Gyn/Onc specialist for staging and specific therapy
2. if 2nd to exog.. estrogens - add progesterone or remove source
3. if 2nd to atrophy - consider hormone replacement and creams to help with symptoms, etc
4. if find polys - removal and histologic eval of polys
5. if endometrial hyperplasia - try Provera 10mg x 10 days or D&C if young; consider therapeutic TAH if older pt.
6. for less common causes and for ca therapies, refer to text and other cases.

26. Postmenopausal Pelvic Mass: 60 year-old Lucinda, G3 P3, is in for an annual exam. She is 9 years postmenopausal (PM). You find a 5 cm solid mobile right adnexal mass.

Background:

First, note that ovaries should NOT be palpable in a PM woman (it should only be 2-3 cm), therefore any enlargement is abnormal. Any adnexal mass should be considered neoplastic until proven otherwise. Malignant ovarian neoplasms may be entirely asymptomatic during the early and curable stages of the disease. 25% of genital cancers are ovarian, but they result in 50% of the deaths. Every female has a 1/70 risk of developing ovarian malignancy during life. Germ-cell tumors are typically more common in children and young women, whereas epithelial tumors are more common in older women. Mean age for ovarian cancer is 55-61. Whites are 50% more likely to develop ovarian cancer than blacks in the US. Women with breast cancer have twice the risk of ovarian cancer. 25% of all ovarian tumors in PM women are malignant (only 10% in reproductive age women are malignant). These malignant tumors are typically (90%) of epithelial cell type. Other tumor types include germ cell tumors and stromal cell tumors.

Differential Diagnosis:

As Lucinda is PM, physiologic cyst can be ruled out. The mass may be ovarian neoplasm, ovarian benign neoplasm, appendiceal abscess, diverticulitis abscess, pelvic adhesions, pelvic kidney, hydrosalpinx, ovarian torsion, fibroids, metastatic colon CA, TOA

Work-Up:

Very straightforward. Careful history taking, being sure to assess family history of breast/ovarian cancer, as both have familial components. Early satiety may signal omental mets. Bloating and

increased girth signal ascites. Look for signs of virilization or hirsutism. Be sure of the date of menopausal onset; if the patient is within 3 years of natural menopause, the mass could be a residual functional cyst that has not regressed. This could drastically change patient management. However, in either case, ultrasound is warranted. CA-125 should be measured, as it is elevated in 80% of epithelial cancers. CEA is often elevated in mucinous adenocarcinomas, and may be checked also. Also, careful physical exam or ultrasound may detect a mass in the other ovary, which drastically increases the odds of malignancy.

MANAGEMENT:

If the patient is within 3 years of menopause, and transvaginal ultrasound confirms a simple, unilocular cyst < 5 cm diameter, you may manage with serial pelvic and ultrasound exams. Other postmenopausal masses should be managed surgically. The presence of ascites on ultrasound is predictive of cancer. In fact, ascites and a pelvic mass should be considered ovarian carcinoma until proven otherwise. Of course, specific patients may not warrant surgical treatment, such as extremely elderly patients, patients with a known lethal co-morbid condition, etc. Otherwise, our patient here should be taken to the OR.

Possible Findings And Treatment:

1. Benign epithelial neoplasms: Most common is serous cystadenoma (70% of serous tumors are benign). More common in PM women. 20% are malignant. Mucinous cystadenoma is the 2nd most common epithelial tumor, with a malignancy rate of 5%. 3rd most common are endometrioid tumors. Lastly, an uncommon epithelial tumor is a Brenner cell tumor; it is more common in the elderly.
2. Benign Germ Cell Neoplasms: Most common is the benign teratoma (dermoid cyst). Recall that a struma ovarii is a dermoid with functioning thyroid tissue. Though malignancy is <1%, treatment is surgical to prevent ovarian torsion. 10-20% of these cysts are bilateral.
3. Benign stromal cell neoplasms: May develop into primarily female cell type (granulosa theca cell tumors-produce estrogen) or primarily male cell type (Sertoli-Leydig cell tumors-produce androgens). These tumors often cause vaginal bleeding in the PM years. An ovarian fibroma occurs in 10% of patients with ovarian neoplasms, but does NOT produce sex steroids. In general, benign ovarian neoplasms are--
 - (1) more common than malignant in ALL age groups
 - (2) chance for malignant transformation increases with age (10% Premenopausal, 25% after)
 - (3) warrant surgical risk due to risk of malignancy
 - (4) surgical treatment may be more conservative, particular if fertility is desired (obviously, not a consideration in this case). Also, in the case of benign neoplasms, it is advisable to remove BOTH ovaries to remove the possibility of future malignant transformation in the other ovary.
4. Malignant ovarian neoplasms: Typically spread by direct extension within the peritoneal cavity. May be classified as epithelial (most common), germ cell, and stromal.
 - (i) Epithelial types: 90% of all ovarian malignancies are epithelial in nature. Most common are serous tumors. There is also mucinous variety, which are among the largest of ovarian tumors. They are associated with thick mucinous ascites, termed pseudomyxomatous peritonei. Next most common are the endometrioid epithelial cell tumors.
 - (ii) Germ cell tumors: Less than 5% of all ovarian malignancies. Most common are the dysgerminomas and immature teratomas. Also, there are mixed germ cell, endodermal sinus, and embryonal.
 - (iii) Stromal cell tumors: Make hormones. Most common is the granulosa cell tumor. May secrete a large amount of estrogen, which may cause endometrial hyperplasia or carcinoma. Sertoli-Leydig cell tumors usually occur in older patients, and should be suspected when patient presents with adnexal mass and hirsutism/virilization.

Management:

In short, this mass could be anything. However, workup would always begin with careful exam and

ultrasound. This is almost always followed by surgical exploration, with staging if necessary. I'm not exactly sure what they expect for this clinical question, but I suspect they want to know

- (1) get an ultrasound
- (2) know that surgery is necessary
- (3) it's more likely to be benign
- (4) any palpable ovary in a PM woman is abnormal, with the possible exception of a PM woman < 3 years onset
- (5) you may want to obtain CA-125/CEA levels pre-surgical
- (6) ascites on ultrasound = bad thing
- (7) for this lady, surgical treatment would be TAH, BSO; probably omentectomy and node dissection, indicated de-bulking, get washings for cytology if indicated
- (8) malignant adnexal masses are often bilateral, hemorrhagic, necrotic, adherent, and solid with ascites, peritoneal studding. Based on just what is presented, and going with the "numbers", this mass is most likely a benign cystadenoma. Treatment is surgical removal, no further therapy.

30. Premenopausal pelvic mass: 25 year-old Betty, G1 P0 Ab1, presents at your office complaining of pelvic pressure symptoms. On pelvic examinations you find she has a 5 cm. cystic right adnexal mass.

Differential diagnosis:

1. Functional Ovarian Cyst: These can be either symptomatic or asymptomatic. They can be further divided into follicular cysts and corpus luteum cysts. <6-8cm
 - (i) *Follicular* cysts occur if a follicle fails to rupture. This lengthens the follicular phase and results in secondary amenorrhea. The cysts are lined by granulosa cells and contain fluid rich in estrogen (because that is what granulosa cells make?). They are significant if they cause pain or if they last longer than one menstrual interval. u/s will show a unilocular simple cyst w/o evidence of blood or other soft tissues. They usually resolve spontaneously within 6-8 weeks, or an OCP can be given to suppress gonadotropins, although this may be better at preventing new cysts than fixing old ones. If it persists, suspect another type of cyst or a neoplasm. Rupture of the cyst can cause acute pelvic pain, but surgery is rarely required.
 - (ii) *Corpus luteum* cysts can either be just slightly enlarged corpus lutea, or rapidly enlarging luteal-phase cysts w/ spontaneous hemorrhage. The first type continues to produce progesterone longer than 14 days, resulting in delayed menstruation, giving pain and missed period as common complaints. Exam for the first will show enlarged, tender, cystic or solid, adnexal mass - in this case pregnancy test should be performed to rule out ectopic pregnancy. This first type may benefit from OCP's. The second, hemorrhagic type, may rupture in the luteal phase, resulting in acute pain. Depending on the extent of the bleeding, surgery may be warranted, whereas with mild bleeding analgesics are all that are required.
2. Ovarian Neoplasm: 25% of ovarian enlargements will turn out to be "nonfunctional ovarian neoplasms." In premenopausal women, 90% of these are benign - this decreases to 75% in postmenopausals. Suspect neoplasm if there is no response to oral contraceptives. The most common tumor type is the benign cystic teratoma (dermoid), which can be diagnosed on u/s due to echogenicity of its internal contents (teeth, hair, etc, I assume). While tumors of the ovary are discussed elsewhere, several points should be remembered: treatment is surgical, if benign and malignant transformation risk increases with age.
3. Endometriosis: This is responsible for the remaining 10% of adnexal masses. Key historical points to elicit are history of infertility, dysmenorrhea, deep thrust dyspareunia, abnormal bleeding, and pelvic pain. Remember, the only true diagnosis of endometriosis is histologic, although our attendings seem pretty sure it when the zap it laparoscopically.

31. Premenstrual Syndrome: 29 year-old Donna, G3 P3, presents at your office complaining of emotional lability, bloating and breast tenderness. The symptoms are so severe in the week prior to her

menses she has difficulty functioning in the home and at work. She wonders if you can help her. [You can't. How do you convince her of this? S.B.]

Background on PMS:

1. This is a syndrome consisting of a constellation of symptoms any subset of which your patient may possess, including--
 - (i) somatic sx(breast swelling/pain, bloating, headache, constipation or diarrhea, fatigue being some of them)
 - (ii) emotional sx(irritability, depression, anxiety, hostility, changes in libido...)
 - (iii) behavioral sx (cravings, poor concentration, sens. to noise, decreased motor skills...); although PMS has been associated with criminal behavior (including homicide), this appears to be an infrequent occurrence
 - (iv) situational depression.
2. To be PMS, these must occur in a regular fashion, occurring in the luteal phase, occurring in most cycles near the onset of menses, with a symptom-free period of at least one week (I think otherwise they are just depressed). Documented history obtained with menstrual diary x 3 mos.
3. Incidence is between 10% and 90%, although severe PMS is in <10% while 70% have some symptoms.
4. Etiology is unknown, with psych, endocrine, diet, endorphins, serotonin, prostaglandin, fluid retention, and vitamins offered - who knows?

Differential Diagnosis: mainly between medical and psychiatric.

Medical considerations include--

1. dysmenorrhea
2. endometriosis (these should both occur with menstruation, I think)
3. thyroid problems (check Free T4/TSH)
4. other endocrine problems
5. anemia
6. hypokalemia
7. lupus.

Psychiatric causes include--

1. anxiety
2. affective and personality disorders as well as some others like substance abuse and eating disorders that a good history should tease out.

Diagnosis:

Based on relating the patient's symptoms to the luteal phase with a menstrual diary. The key is a *documented symptom-free follicular phase*. Then, you have to rule out the above diagnoses with a good physical after a good history.

Treatment:

Education of the patient is important, and it is supposed to provide some benefit ("Now I know I'm not going crazy..."). Contraceptives and other medicines to prevent ovulation such as danazol and GnRH agonists may help. So may progesterone and NSAIDs, and diuretics, and antidepressants. It's a mixed bag, and in serious cases requires time and an integrated, team approach.

33. Prepubertal Pelvic Mass: Prepubertal 8 yo Tamara is referred to you by her pediatrician with the findings of a 4 cm. solid left adnexal mass.

Differential Diagnosis:

1. cystic teratoma (dermoid) #1 in all age groups
2. serous cystadenoma
3. follicular cyst - often in neonate #2
4. dysgerminoma (malignant)
5. GI neoplasm
6. Wilms tumor
7. neuroblastoma

History:

- ~Is there pain or cramping? If so, go through the 7 characteristics.
- ~Is there pelvic pressure?
- ~Is there any vaginal bleeding? vaginal discharge?
- ~Are there GI or urinary symptoms? eg. h/o UC, Crohn's dz
- ~Is there a history of pelvic kidney, ureterocele, carcinoma with poss. mets?

Physical Exam:

- ~thorough pelvic exam for cervical motion tenderness, location of mass
- ~rectovaginal exam for cul-de-sac involvement
- ~assess for LAN (supraclavicular, axillary, inguinal)
- ~breast exam for presence of mass
- ~abdominal exam for masses, ascites
- ~lung exam for signs of effusion

Workup:

1. HCG, AFP, LDH are markers for germ cell tumor
2. CA-125 - 80% of epithelial ovarian cancer
3. CEA - colorectal cancer
4. LFTs - liver mets
5. CXR, CT scan (look for pleural effusion)
6. Pelvic US
7. IVP
8. Abd x-ray to look for calcifications assoc with benign cystic teratoma

Treatment Considerations:

- ~the only normal adnexal mass is a follicular cyst in a neonate secondary to maternal hormone stimulation of fetal ovaries
- ~most masses are benign, most should not disappear
- ~aim to preserve fertility by cystectomy rather than oophrectomy - if ovary must be removed as in germ cell tumor, leave contralateral ovary and uterus (and use chemo rather than radiation, if indicated, as in lymph node spread)

38. Rape Victim: E.R. calls you to see 21 yo Ann, G0 P0, who states that was recently raped

Definition: Sexual assault is oral, manual, or genital contact vs one's will. Rape is the coital form of sexual assault. Rape is the fastest growing violent crime in the US. It is estimated that 1 in 6 women will be raped in her lifetime.

General:

- The health care team has 3 tasks:
- (i) care for the victim's emotional needs
 - (ii) evaluate and treat medically
 - (iii) collect forensic specimens

Consent for treatment is a legal requirement and an important aspect of the emotional care of the victim.

History: is *not* additionally traumatic if done properly. It is both necessary to gain medical and forensic information and an important therapeutic activity. Hx should include the following:

1. Date and time of the assault; date and time of presentation
2. Physical surroundings and circumstances of the assault
3. Nature of the assault and associated pain experiences
4. Weapons and foreign objects used
5. Number of assailants
6. Actual acts that were committed
7. Whether or not ejaculation occurred and whether or not a condom was used
8. Occurrence of vomiting or loss of consciousness
9. Whether or not the patient washed, wiped, bathed, douched, defecated, brushed teeth or changed clothes
10. Use of drugs, Etoh, or medications in proximity to the time of assault
11. Current meds/allergies
12. Date of last tetanus shot
13. Date and time of last consensual intercourse
14. gravity, parity and menstrual hx
15. contraceptive hx
16. general PMH as indicated

Physical Exam/Lab W/U: obtain separate consent for examination and collection of evidence.

Explain to the pt what you are doing and why

1. Note and record vital signs
2. Examine clothing and skin for loose hair, stains, or other debris and collect as evidence
3. Inspect fingernails and preserve cleanings
4. Collect clothing
5. comb pubic hair for loose strands and save
6. Clip and label samples of head and pubic hair for comparison with any loose strands found
7. Perform and record general physical exam with attention to evidence of trauma
8. Inspect genitalia for lacs, abrasions, ecchymoses or hematomas, giving special attention to the posterior fourchette
9. Insert a speculum and examine internally
10. Prepare GC Cx and appropriate smears for the detection of sperm
11. Obtain similar Cx from throat and anus if indicated
12. Collect blood for grouping, syphilis serology, pregnancy testing, drug and Etoh levels, and a reference saliva specimen to determine ABO secretor status of the victim

Medical Tx:

1. All injuries should be appropriately tx (eg. Lacs)
2. Tetanus toxoid should be administered if pt >10yrs since last immunization
3. Prophylaxis for STDs should be offered. The currently recommended regimen is: 4.8 million U of procaine PCN IM following 1g of probenecid orally and Doxycycline 100 mg bid
4. Post coital contraception should be offered: DES with compazine as well as discussion regarding continuation of pregnancy if it has occurred, and 1st trimester abortion

Psychological Management:

1. The initial evaluation provides the opportunity to prepare the victim for the longer term psychological impact of the assault.
2. In the acute phase of adjustment , often irritability, tension, depression, fatigue, and persistent ruminations are seen.
3. Somatic sx of a general nature may occur such as HA and irritable bowel syndrome or specific sx such as vaginal irritation or discharge.
4. Behavioral problems may surface such as overeating or substance abuse.

5. Flashbacks may occur in similar surroundings or other associated stimuli. Studies have found that avoiding such stimuli only exacerbates the reaction. Post traumatic stress disorder is not uncommon.
6. Loss of libido, vaginal dryness and loss of orgasmic capacity are also common sequelae.

Follow Up:

1. Contact by phone or see within 24-48h.
2. Repeat tests for gonorrhea (2 weeks) and syphilis(6 weeks)
3. HIV testing should be offered
4. Repeat pregnancy testing should be done if indicated

44. Sterilization: 20 year-old Tasha, G1 P1, comes to your office requesting permanent sterilization.**General:**

The permanency of surgical sterilization, either female or male, necessitates that extensive counseling and evaluation be done prior to any procedure. Also, pt must be 21 years old if Medicaid.

Types of Sterilization:

1. Vasectomy is the safest and simplest method. It causes no hormonal changes and if reversal is undertaken, no change in spermatogenesis will have occurred. Successful reversal can occur in over 60% of cases
2. Tubal Ligation: fatalities occur in 4 per 100,000 women being sterilized in the U.S. Can be done 4-24 hours following delivery. Subtypes are:
 - a. Laparotomy
 - b. Laparoscopy
 - c. Mini-lap
 - d. Posterior colpotomy
 - e. Hysteroscopy
 - f. Blind cannulation of tubes via transcervical approach

Details of these surgeries can be found on p.465 of Hacker and Moore. The take-home point is that they all tie off, burn off or scar off the fallopian tubes. Patients must be counseled that there is a 1/100 to 1/600 failure rate with tubals, so if they miss a period, they should take a pregnancy test just in case. Risks include: bleeding, infection, ectopic pregnancy if pregnancy occurs.

Miscellaneous:

- *Can be done in the OR or in an outpatient center.
- *Occlusive devices (ie. Falope ring) are put at the junction of the isthmus and ampulla.
- *The Falope ring is more painful post-op because a loop of necrotic tissue remains.
- *Previous PID with adhesions may make laparoscopy hard.
- *Don't use electrocautery on young women because it is harder to reverse and they are the group most likely to want reversal.
- *Laparotomy or mini-laparotomy usually uses the Pomeroy technique.
- *Colpotomy is becoming obsolete because it is difficult to do and may have higher infection rates.
- *There is a slightly higher failure rate when the procedure is done after c-section or puerperally.

47. Urinary Incontinence: 48 year-old Shirley, G5 P4 Ab1, comes to your office complaining of involuntary loss of urine.

Definitions/Causes:

1. Stress incontinence (SI): most common cause; loss of urine associated with coughing, lifting, exercise, etc.; seen most often in women, secondary to relaxation of pelvic floor following multiple deliveries, increased age or estrogen deficiency.
2. True incontinence (TI): Constant or periodic loss of urine without warning, caused by sphincter abnormality (.e.g. exstrophy of bladder) or urinary fistula secondary to sx or radiation.
3. Overflow incontinence (OI): Failure of bladder to empty properly; may be caused by bladder outlet obstruction, or detrusor hypotonicity or anything that causes hypotonicity or desensitization
4. Urge incontinence (UI): Loss of urine secondary to detrusor instability in patients with stroke, dementia, Parkinson's disease, etc.

Workup:

A. Detailed history:

1. A urinary questionnaire, including presence of nocturia, urgency, precipitating events, and frequency of loss.
2. Voiding diary, to measure urine volumes and fluid intake during a 24 hour period.
3. History of urinary tract infections
4. Previous urologic surgery/gyn sx
5. Obstetric history: parity, birth weights, mode of delivery; estrogen status
6. Central nervous system or spinal cord disorders
7. Use of medications, including diuretics, antihypertensives, caffeine, alcohol, anticholinergics, decongestants, nicotine, psychotropics
8. Presence of other medical disorders (e.g. hypertension, hematuria)

B. Physical examination may detect:

1. Exacerbating conditions, such as obstructive pulmonary disease, obesity, or intraabdominal mass
2. Uterine descensus, vaginal prolapse
3. Neurologic disorders

C. Diagnostic tests

1. Midstream urine specimen for culture of infectious causes
2. Urodynamic testing to determine:
 - a. flow rate of urine
 - b. residual urine volume of bladder
 - c. Cystometrics to determine bladder capacity, tone and dynamics, by filling bladder with water and saline to determine volumes when the desire to void were felt and to recreate situation in which incontinence occur (i.e. detrusor instability, or genuine stress incontinence)
 - d. Q-tip test to measure urethral axis. A Q-tip is inserted into the urethra with the patient in the lithotomy position. If the Q-tip moves more than 30 degrees from the horizontal with valsalva, there is abnormal urethral mobility consistent with pelvic floor relaxation in stress incontinence.

Management:

SI: Bladder neck suspension, pessaries, estrogen therapy, alpha-adrenergic stimulation, biofeedback Rx

UI: Pharmacotherapy (anticholinergics, alpha-adrenergic agonists), bladder denervation, and augmentation cystoplasty, behavioral Rx, biofeedback Rx

OI: Self-cath, surgical relief of obstruction; avoidance of indwelling catheters (reduce # of UTI's)

TI: Appropriate surgical intervention, i.e. repair of fistula

49. Vaginal Discharge/Itching: 34 y.o. Heather, G4, P3 Ab1, comes to your office complaining of vaginal discharge and itching for the past 4 days.

Normal Vaginal Physiology: post pubertal

- pH 3.5-4.5
- 3-8 types of bacteria present with lactobacilli predominating

Differential Diagnosis:

1. Trichomonas
 - caused by the flagellated Trichomonas vaginalis which lives in vagina and male urethra
 - 25% infected females asymptomatic
 - vaginal discharge is bubbly and grayish green with a foul odor; strawberry cervix (petechiae)
 - pruritis, burning, urinary frequency, dyspareunia
 - pear shaped motile organism on wet mount
 - Tx: flagyl 500 mg bid X 7 days (partner also) or 2 g flagyl X1. Use clotrimazole (gyne-lotrimin) in 1st trimester because flagyl is teratogenic.
2. Bacterial vaginosis
 - tx: flagyl same as for Trich
3. Molluscum contagiosum
 - caused by a growth stimulating virus
 - usually asymptomatic or mild pruritis
 - red to yellow papules
 - tx: carbonic acid / trichloroacetic acid / silver nitrate and manually express caseous content of lesions (no doubt an MSIII's job - right up there with manual disimpaction!)
4. Candidiasis
 - vaginal discharge with cottage cheese appearance
 - 20% asymptomatic
 - pruritis, burning, dyspareunia
 - hyphae / spores on KOH prep
 - Tx: Miconazole (Monistat) / Clotrimazole (Gyne-Lotrimin) / Butoconazole (Femstat) / fluconazole 150 mg po (Diflucan)
 - allergic vulvovaginitis
 - irritative vulvovaginitis

History:

- Pruritis, dyspareunia, burning?
- Urination troubles?
- Describe discharge. (color, consistency, amount, odor)

Physical Exam/Workup:

- wet prep
- KOH prep if suspect candidiasis

Treatment: as above. Don't forget the partners.

50. Vulvar Lesions: 57 year-old Lottie, G5 P3 Ab2, comes to your office complaining of vulvar itching for 6 months. On exam you find a 6 x 10 mm white lesion on the right labia majora.

Differential Diagnosis:

1. **Vulvar Intraepithelial Neoplasia (VIN):** presenting complaints include vulvar pruritus, chronic irritation, and a development of raised mass lesions. Normally, the lesions are fairly well isolated and are raised above the normal epithelial surface and have a *whitish cast or hue*. As with other vulvar lesions, *diagnosis by biopsy is mandatory*. Microscopically, the lesions mimic intraepithelial neoplasia elsewhere, including mitotic figures and pleomorphism, with loss of normal differentiation of the lower one-third to one-half of the epithelial layer. The goal of treatment is to quickly and completely remove all areas of involved skin. Most isolated and limited VIN-I (mild dysplasia) and VIN-II (moderate dysplasia) lesions may be removed by local excision, cryocautery, electrodesiccation, or laser cautery. VIN-III (carcinoma in situ) is best treated by wide local excision with or without combination laser ablation.
2. **Vulvar Cancer:** typically affects postmenopausal women (65-70 years), with *vulvar pruritus* being the most common presenting complaint. In addition, patients may notice a *red or white* ulcerative or exophytic lesion arising most commonly on the posterior two-thirds of either labium majus. A thorough biopsy is mandatory. These tumors account for 4% of all gynecologic malignancies, and 90% are of the squamous cell variety. It spreads in a predictable fashion to the regional (including inguinal and femoral) lymph nodes, and lesions in the anterior one-third of the vulva may spread directly to the deep pelvic nodes. Staging is clinical, with an overall 5-year survival rate of 70% (but only 20% if the deep pelvic nodes are involved). The mainstay of treatment is surgical.
3. **Paget's disease (of the vulva):** a rare (0.5% of vulvar CA) intraepithelial adenocarcinoma that often appears as a velvety red lesion with areas of superficial white coating ("cake-icing" effect). Noninvasive lesions are treated with wide excision, while invasive lesions may be treated with a radical vulvectomy.
4. **Lichen sclerosis (et atrophicus):** a slowly developing, chronic, localized lesion of unknown etiology. Most patients are 50 years or older, and have involvement on both sides of the vulva, with the most common sites being the labia majora, labia minora, the clitoral and periclitoral epithelium, and the perineal body [can also involve the neck, shoulders, and forearms]. *Chronic vulvar pruritus* normally occurs, and inspection of the vulva reveals an ivory white, smooth surface. The treatment of choice is topical testosterone propionate, although the lesion is unlikely to resolve totally. *Microscopic confirmation via biopsy is mandatory*.
5. **Hyperplastic Vulvar Dystrophy:** usually produces a white or reddish area on the surface of the vulva; will likely need to be confirmed via biopsy. Initial treatment with fluorinated topical steroids relieves pruritus; follow-up examinations with constant search for progressive change and possible malignancy are essential.
6. **Lichen planus:** may have areas of whitish, lacy bands of keratosis near the reddish ulcerated-like lesions characteristic of the disease. Complaints include chronic vulvar burning and/or pruritus and insertional dyspareunia and a *profuse vaginal discharge*. Biopsy may be warranted to confirm the diagnosis in some patients. Not malignant or premalignant; treatment consists of topical steroids.
7. **Lichen Simplex Chronicus:** secondary to an irritant dermatitis, which progresses to lichen simplex chronicus as a result of the effects of chronic mechanical irritation from scratching and rubbing. Inspection usually shows diffusely reddened areas with occasional hyperplastic or hyperpigmented plaques of red to reddish brown; biopsy of patients with these characteristic findings is usually not warranted. Treatment includes Benadryl and topical steroid creams.
8. **Psoriasis:** may involve the vulva, with lesions typically slightly raised round or ovoid patches with a silvery scale appearance atop an erythematous base. Pruritus is usually *not* marked, and the diagnosis is generally known because of psoriasis elsewhere, obviating the need for biopsy.

Workup and Management:

The major symptoms of vulvar disease include pruritus, burning, nonspecific irritation, and/or appreciation of a mass. Further history will be of limited value in these patients, but questions concerning associated local symptoms (e.g., vaginal discharge) and constitutional symptoms (e.g., weight loss) may be helpful. On physical exam, be sure to look/palpate for enlarged/tender groin lymph nodes.

The **need for a thorough biopsy is near-universal** in the workup for vulvar disease. Management will depend upon the findings, as described with each item in the differential diagnosis.

51. Preventative Care and Routine Screening: A 60 y.o. G4 P4 patient presents for annual exam. What should this include? How would this list change if patient was 40 y.o. or 20 y.o.?

60 year old:

- cholesterol screening first at 20 yo then q5 years (q 3-4 years if >65)
- rectal/hemoccult q1y >50y.o.
- sigmoidoscopy q3-5 y >40
- colonoscopy >40
- Pap/pelvic/breast q 1 year after sexually active or at 18yo
- mmg baseline at 35yo q 1-2y <50; q1y>50 or strong suggestive history
- dT q10 yrs.
- measles booster if born after '56
- rubella vaccine if reproductive age without proof of immunity
- influenza vaccine q1y >55
- Pneumovax X1 >65
- TSH q3-5 yrs >65
- TB skin testing
- HRT after menopause / oophorectomy

Section II: Endocrinology and Fertility

15. Hirsutism/Virilism: 18 year-old Marla, G0 P0, comes to your office complaining of excessive dark, coarse hair growth on her face, chest, and pubic area.

Definition:

Hirsutism- excessive body hair

Virilism- masculinization: deepening voice, male body habitus, temporal balding, clitoromegaly

Differential Dx:

- (i) Polycystic Ovary Syndrome (PCOS)
- (ii) Congenital Adrenal Hyperplasia
- (iii) Idiopathic/Genetic
- (iv) Ovarian Tumor/Neoplasm
- (v) Hyperthecosis
- (vi) Adrenal Tumor

Work Up:

1. First, obtain DHEAS and testosterone levels. If the level of testosterone exceeds 200ng/dL, an ovarian neoplasm should be suspected and followed by an abdominal CT. If the DHEAS level is above 700microg/dL, it should be followed by a dexamethasone suppression test. Failure to lower the DHEAS suggests adrenal neoplasm. However, the most common cause of adrenal androgen excess is a deficiency of 21-hydroxylase. The patients with a mild form of this deficiency usually display hirsutism during or after puberty. Other possibilities include 11-beta-hydroxylase or 5-alpha-reductase deficiency.
2. In this patient, PCO is the most likely etiology of hirsutism. The anovulation characteristic of this syndrome, is associated with an increase in LH, which stimulates androgen production by the ovaries. The diagnosis of PCOS is a clinical one with the classic presentation being hirsutism, obesity, and amenorrhea. The diagnosis should be confirmed by laboratory testing. Hyperthecosis is a more severe form of PCO, with a marked elevation of androstenedione and symptoms of virilization.

Treatment:

In this case, the first line of treatment should be an OCP, which will suppress LH production by the pituitary. They also increase the circulating amount of SHBP to decrease levels of free testosterone, and the progesterone component will oppose estrogen. If the problem is adrenal in origin, daily prednisone will suppress adrenal androgen production. Cosmetic - shaving, electrolysis; Sx for neoplasms.

18. MENOPAUSE: 51 year-old Hattie, G3 P3, has had increasing irregular menses. Her last period was 3 months ago. She has been experiencing sudden onset of profuse, embarrassing diaphoresis and sensation of heat. She finds her emotional state increasingly labile.

Definition: Menopause is the culmination of climacteric which is a time of transition when ovarian function begins to wane. One sees increase menstrual irregularity and varying decreases in menstrual flow, hot flashes, nervousness, mood changes, and decrease vaginal lubrication, tissue atrophy and aging from decreased production of estrogen and other hormones. The result is cessation of menses and thus cessation of fertility. Median age = 51. Range = 45-55, <40 is considered premature ovarian failure.

Pathophysiology: Basically menopause is the depletion of ovarian follicles. The ovaries can't respond to gonadotropins and thus decrease production of estrogens, progesterone, and androstenedione. The process begins slowly and before actual menopause, and women will have oligo-ovulation or anovulation. The quality of ova and fertility decrease and pregnancies occur less frequently and result in more chromosomal anomalies. Decrease progesterone causes shorter more irregular menstrual bleeding, among other things. Women have elevated gonadotropins and

decreased sex hormones such that FSH gets 10-20X nl and LH 3X nl. FSH >40mlu/ml is diagnostic of menopause.

Clinical Manifestations:

1. Vasomotor - hot flashes in 75% (relative decrease in estrogen)
2. Genital Atrophy - dryness, irritation, dysuria, vaginitis (dec. estrog.) atrophy also leads to dyspareuria and vaginal bleeding, urethral support weakens and get increase stress incontinence.
3. Osteoporosis - Ca 25 is lost primarily from trabecular bone (i.e. vertebrae and femoral neck); women can shrink 2.5 inches in height secondary to vertebral fractures.
4. CV disease - cholesterol, LDL, triglycerides all increase and HDL decreases leading to significant increase in CV disease.
5. Emotions - insomnia, poor memory, mental confusion, lethargy, irritability, nervousness, fatigue, dizziness, inability to cope, and decreased libido.

Management:

- You must patiently listen to pts. history and the discuss the normal aspects of menopause with her, explaining therapy to decrease symptoms when applicable.
- Hormone replacement therapy is the standard of care for those able to use it and 0.625mg of conjugated equine estrogen or 1.25mg or (piperazine estrone sulfate is protective from increased CV disease and helps genital symptoms(estrogen creams are also useful).
- To prevent osteoporosis, hormone therapy and 1000mg of Calcium is proven beneficent (1500mg cal if the patient is not on hormone replacement.)
- Emotional concerns should be dealt with on individual basis depending on the specific combination of symptoms of each pt.

28. PRECOCIOUS PUBERTY - 5 year-old Lucy is referred to you by her pediatrician with the findings of breast development along with pubic and axillary hair.

Definition:

Recall that the usual sequence of puberty is

- (1) Thelarche (breast development) at 9.8 years
- (2) adrenarche (pubic and axillary hair development) at 10.5 years
- (3) maximal growth spurt at 11.4 years, and
- (4) menarche (onset of menses) at 12.8 years.

If physical signs of secondary sexual development appear before the age of 8 years, you should consider the diagnosis of precocious puberty (PP). This condition is more common in females. It also has no serious pathology; it simply causes an advance in sexual maturation and carries the risk of short stature because of premature closure of the epiphyseal plates.

Differential Diagnosis:

1. McCune-Albright syndrome - (i.e., polyostotic fibrous dysplasia) consists of cafe-au-lait spots, multiple disseminated cystic bone lesions, and precocious puberty. H/O bone fractures and PP. This syndrome is seen in about 4% of patients with PP.
2. Primary hypothyroidism - Patients may also have galactorrhea. Thyrotropin releasing hormone becomes elevated, which elevates TSH. It also elevates FSH and LH. Always assess thyroid function in PP patients.
3. Ectopic gonadotropin production - Less than 0.5% of cases. Tumors implicated are dysgerminomas and chorioepitheliomas of the ovary and hepatomas of the liver. Presence of abdominal tumors or ascites is a clue.
4. Tumors - Ovarian tumors, adrenal tumors, and congenital adrenal hyperplasia.
 - (i) The most common cause of this is congenital adrenal hyperplasia 21-hydroxylase deficiency type. Recall that 21-hydroxylase converts progesterone to desoxycorticosterone. Obviously, there is a deficit of cortisol in the body. However, there is also a build-up of adrenal androgens, which results in precocious puberty. In girls, there is premature development of pubic hair followed by axillary hair. Breast

development either does not occur or is incomplete for the stage of sexual development. In males, there is premature enlargement of the phallus and the appearance of axillary and pubic hair. However, the testicles remain small because the source of androgens is the adrenal gland rather than the testicles.

- (ii) About 80% of ovarian tumors are palpable on exam. Tumor estrogen production will produce breast growth and vaginal bleeding, along with skeletal maturation. In this condition, there will be rapid breast development without sexual hair growth.
 - (iii) Adrenal tumors are not common, though an adrenal carcinoma may secrete estrogen and cause PP.
5. Premature thelarche is relatively common, probably secondary to increased sensitivity of the breast tissue to estrogen, so that lower levels of the hormone stimulate breast growth. It is usually benign and required no tx.
 6. Tumors of the hypothalamic-pituitary stalk or transient inflammatory conditions of the hypothalamus. In this situation, typically sexual development begins early but proceeds slower than the usual rate.

History:

Patient's growth history should receive special attention. The progression of menarcheal events in PP may be confused and are often slower than normal. Evaluate height, as these patients are usually tall for their age. However, due to premature epiphyseal plate closure, their eventual height may be sub-average. (1/2 of these patients will be less than 5 feet tall.) NOTE: Onset of dental eruption is more closely related to chronological age than skeletal age. Do not forget drug ingestion - ingestion of exogenous estrogenic meds (e.g. OCP's) may cause a darker pigmentation of the areola and nipples (Ask patient's mother about her method of contraception).

How to Diagnose:

1. Thyroid studies - Can easily rule out primary hypothyroidism.
2. Measure adrenal androgens, such as dehydroepiandrosterone, dehydroepiandrosterone sulfate, and androstenedione, to evaluate function of 21-hydroxylase. Will be elevated in 21-H deficiency.
3. Abdominal exam/pelvic/US to evaluate for pelvic masses/tumors.
4. Head CT to evaluate for tumors of the hypothalamic-pituitary stalk.
5. LH, FSH, 17OHP

Treatment:

- If PP is within a few months of the expected time of normal puberty, it is probably ok to let it progress.
- If puberty is advanced by several years, it should be stopped. The use of GnRH agonists in a continuous fashion will block the periodic secretion of GnRH and suppress pituitary gonadotropin secretion. This will eliminate menses, delay closure of the epiphyses, and inhibit the development of secondary sexual characteristics.
- Do not neglect psychological support.

This Case:

- As breast development IS occurring, you could probably rule out congenital adrenal hyperplasia.
 - Estrogen production by ovarian tumor typically causes breast development *and* skeletal growth, but *not* hair growth, so this could probably be ruled out.
 - It seems that puberty is developing early, but following the *normal* steps. This would suggest a central cause or a *pituitary-hypothalamic stalk lesion*.
 - A history of broken bones, or cafe-au-lait spots on exam could suggest McCune-Albright syndrome.
 - Adrenal tumor is a possibility. (but usually patients are more virilized)
 - Suggest work-up would be *thyroid studies*, thorough *physical exam* with pelvic, good *neurological exam* paying attention to visual field limits. Further studies would include head CT.
- Regardless of the cause, this **development should be stopped by GnRH agonists.**

35. Primary Amenorrhea: 19 year old Rhonda G0 P0, presents at your office stating she has never had a menstrual period

Definition:

- complete absence of menstruation in a woman of reproductive age who has **never** had a period
- the diagnosis of primary amenorrhea is made when no spontaneous bleeding has occurred by the age of 16 ½ years. Thus a woman who menstruates only in response to exogenous hormones would have primary amenorrhea.
- work up is instituted earlier if patient presents with no breast development by age 14 or who has failed to menstruate spontaneously within 2 years of the onset of breast development (thelarche) and pubic or axillary hair development (adrenarche).

Pathophysiology: normal menstruation requires the following components:

- (i) patent outlet (normal vagina and cervix)
- (ii) a uterus that responds to estrogen and progesterone stimulation
- (iii) ovaries that respond to gonadotropins with estrogen and progesterone production
- (iv) the pituitary and hypothalamus, which sense the hormonal milieu and respond with release of gonadotropins

Injury or other pathology to any of these components can cause amenorrhea. The anatomical existence and normality of the female organs deserve special attention when evaluating primary amenorrhea.

Differential Diagnosis:

Pregnancy
 Hypogonadotropic hypogonadism
 Kallman's syndrome
 Gonadal dysgenesis
 Androgen insensitivity
 Congenital absence of the uterus
 17,20 desmolase deficiency
 17 α -hydroxylase deficiency with either 46XX or 46 XY
 Prolactinoma
 Polycystic ovary
 hypothalamic dysfunction
 Hypothalamic-pituitary failure
 ovarian failure

History:

- Determine if this is primary or secondary
- Determine past medical history including any birth history since often other abnormalities such as heart and kidney are associated anomalies of gonadal failure or gonadal agenesis/dysgenesis
- Determine past surgical history to conclude if any gonadal tissue had been removed at birth
- Determine nutritional status since anorexia and stress can cause amenorrhea
- Determine athletic status since high performance athletes (gymnasts) are often amenorrheic
- Take a sexual history and include any contraceptive methods currently used (some women can be pregnant if they had sex during ovulation of their very first period)
- Take a family history since if mom/sisters were late, the daughter will probably be late
- This Case: since we know Rhonda has never had a period, we know she has *primary amenorrhea*, now we must ascertain her breast, pubic and axillary hair development as well as all of the detailed history above.

Physical Exam:

After a complete physical exam with testing of the olfactory system included, and assessing any cardiac or renal abnormality based on the history given a pelvic and breast exam is necessary

Breast exam: assess development and tanner stage

Pelvic exam: assess the presence of any pubic hair and tanner stage. Assess the presence of the hymen, and the uterus.

Labs:

- β hCG
- FSH
- GnRH test if indicated (see above 1.)
- Testosterone level as indicated (see above 2.)
- Karyotype if in question as stated above
- Prolactin level

Workup and Management:

Management will vary widely depending on the abnormalities found. If normal female external genitalia are present, one can divide primary amenorrhea into four general categories--

1. Patient with no breast development and uterus present
2. Patient with breast development and no uterus present
3. Patient with no breast development and no uterus present
4. Patient with breast development and uterus present

1. Patient with no breast development and uterus present:**Differential includes:**

- (i) hypogonadotropic hypogonadism (hypothalamic or pituitary failure)
 - FSH levels are low or low normal
- (ii) gonadal dysgenesis
 - Causes include 45 X (Turner's); structurally abnormal X chromosome; mosaicism with or without a Y chromosome; pure gonadal dysgenesis 46XX and 46 XY; and 17 α hydroxylase deficiency with 46 XX (patients will also have HTN and hypokalemia)
 - FSH levels are elevated (in the menopausal range)
 - Patients with elevated FSH and primary amenorrhea require a karyotype to establish the diagnosis of ovarian failure and determine the presence of Y chromosome
 - Measuring LH is of no further diagnostic value
 - These patients are sterile and can carry a pregnancy only if a donor egg is used and transferred to the uterus

Work-up:

- (i) Hypogonadotropic hypogonadism is the most common cause in this group of patients.
 - To differentiate between hypothalamic or pituitary origin perform a GnRH test- if there is an appropriate LH response following the administration of exogenous GnRH the diagnosis of hypothalamic failure to produce or secrete adequate GnRH is made. If no response after priming the pituitary with a 10-day course of GnRH the diagnosis of pituitary failure is made.
- (ii) Some patients may have amenorrhea with anosmia (*Kallman syndrome*)
 - Coffee, tobacco, orange, and cocoa can be used to assess the integrity of the olfactory system
- (iii) Rarely a craniopharyngioma may present with amenorrhea. In this case a CT or MRI is necessary to assess the hypothalamic-pituitary axis
- (iv) Gonadal dysgenesis pts have hypergonadotropic hypogonadism caused by a genetic or enzymatic abnormality that results in failure of gonadal development or abnormal functioning ovary.

Management :

- (i) Evaluate for intracranial tumors by checking thyroid function and levels of GH, prolactin, and cortisol. Skull X-rays of the sella turcica and CT of the pituitary region are also recommended
- (ii) Patients with gonadal dysgenesis should have a CXR, EKG, IVP, and thyroid function tests to evaluate the common associated problems
- (iii) All patients should be treated with estrogen-progestin replacement to induce breast development, cyclic menstrual bleeding, and to prevent osteoporosis and coronary heart disease

2. Patients with breast development and no uterus present

Differential includes:

- (i) Androgen insensitivity (testicular feminization syndrome)
- (ii) Congenital absence of the uterus (these patients have ovaries)

Work-up:

to differentiate, test for ovulation or testosterone. Androgen insensitive patients have normal male levels, and congenital absence of the uterus have normal female levels

Management:

- (i) Androgen insensitivity
 - a. Androgen insensitive patients are XY genotype but are phenotypically female because an androgen intracellular receptor is not functioning (a maternal X-linked recessive gene). The Wolffian system does not develop despite normal male levels of testosterone. The MIF is still present so the mullerian system does not develop. These patients have *large breasts with immature nipples*, but no axillary or pubic hair (none to scant).
 - b. These patients should be karyotyped to establish the diagnosis. The testicles should be removed to prevent malignant transformation and the patient should be treated with estrogen
- (ii) Congenital absence of the uterus
 - a. These patients have sexual hair and mature nipples; 40% have associated renal anomalies so an IVP or an US should be performed to establish renal function
 - b. These pts require no HRT since they have functioning ovaries. These patients cannot conceive or carry a pregnancy unless the patient with an absent uterus undergoes IVF with embryo transfer to a surrogate mother

3. Patients with no breast development and no uterus**Differential includes:**

- (i) 17,20 Desmolase deficiency
- (ii) agonadism (vanishing testicles syndrome)
- (iii) 17 hydroxylase deficiency with 46XY karyotype
 - These patients are rare and often have a male karyotype (46XY) elevated gonadotropins, and serum testosterone level within the normal female range

Work-up and management:

- (i) 17,20 desmolase deficiency: diagnosed by incubation studies with a portion of gonadal tissue. 17,20 Desmolase prevents the formation of estrogen and testosterone, but not aldosterone, cortisol, or progesterone. Therefore there is a deficiency of sex hormones. These patients have no breast development. They should have any gonadal tissue removed and treated with estrogen replacement to prevent osteoporosis and CVD
- (ii) Agonadism: suspected by a lack of testosterone response following the daily administration of hCG and confirmed by laparotomy.
- (iii) 17 hydroxylase deficiency with 46XY karyotype: may have elevated BP and hypokalemia secondary to the increased aldosterone. If gonadal tissue is present remove to prevent malignant transformation and treat with HRT to induce breast development and prevent osteoporosis and CVD

4. Patients with breast development and uterus present**Differential includes:**

- (i) Polycystic ovary disease
- (ii) Hypothalamic dysfunction
- (iii) Hypothalamic pituitary failure
- (iv) Ovarian failure
- (v) Prolactinoma

Workup and Management:

- (i) 25% of these patients have an elevated prolactin level with no galactorrhea, and radiographic abnormalities of the sella turcica suggestive of a pituitary adenoma, therefore r/o prolactinoma

- (ii) If prolactin is normal: same differential as secondary amenorrhea, so both groups of patients undergo similar systemic evaluation (Please see chart attached).

36. Primary Infertility: 30 year-old Marsha, G0 P0, has been married for 5 years. In spite of not using any contraception she has been unable to get pregnant. She desperately wants a child and comes to your office.

Definition:

- Infertility is defined as the failure to conceive after 1 year of unprotected intercourse
- The incidence of pregnancy after 2 years of regular, unprotected sex is 93%. Obviously, this couple is infertile, a condition affecting 15% of US couples. You may also tell her that 80% of infertile couples will conceive with proper treatment.

History:

- Menstrual History: determine the regularity of her cycles. Irregularity could signal anovulation, and points to a female cause of infertility.
- Regular cycles could lead you to look to the male partner in greater detail. Specifically, decreased sperm production could be caused by thermal shock, such as hot tub use, marijuana use, tight clothing that pulls the testicles too close to the body, prolonged sitting which could cause poor heat dispersion. Recall that sperm production occurs at a temp approximately 1 degree F lower than body temp.
- Has the male ever fathered a child in a previous relationship? Has the female?

Workup:

1. First, evaluate for ovulation.
 - The cheapest and simplest way is by temperature chart. The characteristic biphasic temp shift occurs in more than 90% of ovulating women. Ovulation results in a rise in BBT due to progesterone. 13-14 days post-ovulation, the temp falls and menses begins within 24-36 hrs.
 - A temp elevation of more than 16 days suggests pregnancy.
 - Ovulation detection kits, which test for urinary LH, are available and relatively inexpensive.
2. A normal semen analysis excludes a male cause for infertility in more than 90% of couples.
 - This test examines *quantity* and *quality* of seminal fluid:
 - a. Sperm count per mL
 - Normal fertile > 20,000,000
 - Subfertile between 5,000,000 and 20,000,000
 - Infertile < 5,000,000
 - b. Normal Volume \geq 2.5 mL
 - c. Viscosity: full liquefaction within 60 min
 - d. Motility: 60% motile within 4 hr of collection; higher motility suggests higher fertility
 - e. Differential: < 25% abnormal forms
 - The test is relatively cheap and is indicated as an early part of an infertility exam.
 - On physical exam, look for varicocele or signs of infection as a cause for oligospermia.
3. A hysterosalpingogram (HSG) is an x-ray study in which radiopaque dye is injected through the cervix into the uterus. The dye SHOULD fill the uterus, tubes, and ultimately spill into the peritoneal cavity and pool in the cul-de-sac.
 - This test will detect congenital anatomical abnormalities from a simple septum to a complete reduplication of the reproductive organs.
 - Perform this test between days 7 and 11 of the cycle, as the test could interfere with a possible pregnancy event.
 - If performed during menses, retrograde menstrual flow could be increased. This test may also be therapeutic, in that it may unclog a blocked tube.
4. Diagnostic laparoscopy allows visualization of the reproductive organs. This could reveal tubal damage from a previous infection (usually from gonorrhea or chlamydia). Endometriosis, which can cause scarring and adhesions that immobilize the tubes could also be evaluated. This method is complementary to HSG, not a substitute.

5. Blood tests for FSH, LH, prolactin, OHEAS, testosterone, TSH, T4, and progesterone may be indicated. Immunologically, the presence of anti-sperm antibodies in the male or female may be tested for.
6. Lastly, a post-coital test may be performed. Here, you sample the cervical fluid on day 10-14 about 8 hours after the couple has sex. This allows evaluation of coitus, ejaculation, sperm pickup, motility, storage, and cervical mucus.

Treatment:

1. Male factors: 40% of infertility
 - If the problem is *environmental*, behavioral counseling may be necessary. Discontinue hot tub use or activities calling for prolonged sitting. Get rid of the tight jeans.
 - Oligospermia due to hormonal abnormalities does not respond well to induction of spermatogenesis.
 - There is no known treatment for men with anti-sperm antibodies.
 - Varicoceles may be surgically repaired.
 - Note that marijuana use may cause decreased sperm production.
2. Female factors: 60% of infertility
 - Anatomic problems may be fixed surgically (30% of *all* infertility)
 - Anovulation is initially treated with clomiphene. This drug is an antiestrogen which blocks receptors at the hypothalamic/pituitary level, thus inducing an increase in FSH release from the pituitary. Progesterone is given to induce menses, and clomiphene (typically 50-100 mg/day) is begun on day 5 of menses, and given for 3-5 days. Ovulation should occur 14 days after the first day of clomiphene. This drug is effective and cheap.
 - If clomiphene fails, you may try administering FSH directly. Pergonal, a purified preparation of gonadotropins from the urine of postmenopausal women, is given parenterally. You **MUST** monitor serum estradiol carefully, and use frequent US of the ovaries.
 - Complications occur relatively infrequently in well monitored cycles, and include hyperstimulation of the ovaries, multiple gestation, and fetal wasting.
 - Assisted reproduction, such as egg/sperm donation, IVF, GIFT, etc, may be performed, but usually only by a reproductive endocrinologist.

Order Of Tests:

The following order is a general rule, but should be modified appropriate to individual circumstances:

1. BBT chart for ovulation. Possibly use of ovulation detection kit.
2. Serum levels of FSH, LH, TSH, prolactin, etc. as indicated
3. Semen analysis.
4. Post-coital test.
5. HSG.
6. Diagnostic lap.

41. Secondary Amenorrhea: 24 year-old Debra, G2 P1 Ab1, has not had a menstrual period since her last pregnancy 15 months ago.

Definition: failure to menstruate for a period of *6 months* in a woman of childbearing age who has previously menstruated *regularly*; >12 months in a woman with a h/o oligomenorrhea, or, the absence of menses for a total of three previous cycle intervals (for irregular menstruation). [the incidence is approximately 0.7%]

Oligomenorrhea: a reduction of menses, with the interval > 40 days but < 6 months.

Hypomenorrhea: a reduction in the number of days or the amount of menstrual flow.

Pathophysiology: normal menstruation requires the following components:

- (i) patent outlet (normal vagina and cervix)
- (ii) a uterus that responds to estrogen and progesterone stimulation
- (iii) ovaries that respond to gonadotropins with estrogen and progesterone production
- (iv) the pituitary and hypothalamus, which sense the hormonal milieu and respond with release of gonadotropins

Injury or other pathology to any of these components can cause amenorrhea.

Differential Diagnosis:

More Likely Causes in this patient (related to pregnancy and childbirth)--

- (i) Pituitary infarction (Sheehan's syndrome) due to postpartum hemorrhage; a > 75% destruction is usually required for a patient to be symptomatic. These patients may present with a *failure to nurse* and a loss of pubic/axillary hair; they may also have other symptoms of pituitary insufficiency.
- (ii) Destruction of endometrium and uterine scarring (Asherman's syndrome). Causes include D&C due to retained products of pregnancy and *infection* of the uterine cavity.

Less Likely Causes--

- (iii) Pregnancy (*the* most common cause of amenorrhea, possible but less likely with this patient)
- (iv) Breastfeeding (usually only about 10 months amenorrhea)
- (v) Hypothalamic-pituitary dysfunction other than Sheehan's syndrome (includes weight loss, excessive exercise, obesity, drugs [marijuana, tranquilizers], neoplasms, chronic anxiety, anorexia, head injury)
- (vi) Ovarian dysfunction (Savage syndrome, premature menopause, autoimmune, alkylating agents used for chemotherapy)
- (vii) Other (Cushing's disease, hypothyroidism, etc.)

History:

What was the outcome of her last pregnancy 15 months ago? was it successful?

The most important question, and will guide you through the rest of the history.

Did she most recently have an abortion or miscarriage? Was a D&C necessary?

The patient has had 1 abortion, although it could have been with the earlier pregnancy. A recent D&C suggests endometrial scarring and compromised outflow tract (Asherman's syndrome)

Were there any other complications of the pregnancy, delivery, or puerperium?

Possibilities include postpartum hemorrhage w/ pituitary infarction (Sheehan's syndrome); uterine infection w/ scarring (suggests Asherman's syndrome); choriocarcinoma w/ alkylating chemotherapy (ovarian failure)

Was she able to nurse post-partum? Is she still nursing?

Failure to nurse w/ breast involution suggests a pituitary origin. If she is *still* nursing at 15 months, physiologic suppression is a possibility, but further workup is still necessary.

Has she experienced hot flushes in the last 15 months?	Estrogen deficiency caused by ovarian failure causes hot flushes, whereas estrogen deficiency caused by hypothalamic-pituitary dysfunction does not.
What is her menstrual history (regularity, etc.)?	Establish a baseline (she may have a history of irregular cycles and may have required tx of infertility to conceive)
Is she sexually active? Does she have a Hx of STD's?	Sexual Hx may give a hint of prior infections.
Does she use birth control? If so, what?	"Post pill" amenorrhea is generally < 6 months, so is <i>not</i> in the differential for this patient. IUD's are associated with a higher rate of pelvic infections.
Does she have any other significant medical conditions? What medications is she on?	Antipsychotics, tricyclic antidepressants, antihypertensives [reserpine and methyldopa], antianxiety agents, Reglan, opiates, barbiturates, and estrogens can cause amenorrhea. (via increased PRC levels)
Does she have any significant family history of diseases?	A family Hx of pituitary, pancreatic, and parathyroid tumors (MEN-I) would suggest considering pituitary causes.

In the event the above history is non-contributory, it will be necessary to gather more detailed information, especially relating to illegal drug use, weight loss, exercise, mood/sleep changes, visual field changes, vaginal dryness, dyspareunia, hair growth, voice changes, etc

Physical exam:

Check for the presence of normal female anatomy and signs of pregnancy; anorexic vs. obese; hirsutism vs. loss of pubic hair; clitoromegaly (excess androgens); smooth vagina with dry endocervix (estrogen deficiency); galactorrhea (elevated prolactin, but could be normal if nursing)

Workup:

1. hCG level to rule out pregnancy (regardless of sexual Hx)
2. Thyroid function tests (T_4 and TSH) to rule out rare cases of asymptomatic hypothyroidism; a *low* TSH with *low* T_4 suggests pituitary insufficiency.
3. Serum prolactin levels; if positive a CT scan of the head should be performed
4. Serum FSH and LH to determine if there is primary ovarian failure (high values) vs. hypothalamic-pituitary dysfunction (low values)
5. Progestin administration to assess the level of endogenous estrogen and the competence of the outflow tract; if there is no withdrawal bleeding, the test may be repeated, 1st giving exogenous estrogen to "prime" the uterus
6. Specialized tests depending on the history (e.g., for a woman with a prior D&C, a hysterosalpingogram or hysteroscopy might be used instead of progestin administration to check for a competent outflow tract).
7. Other testing (e.g., adrenal function) as necessary

Management:

1. If outflow tract obstruction due to endometrial scarring is suggested (Asherman's syndrome), surgical correction is generally successful. Hormonal (estrogen) therapy may also be used to help the endometrium cover up the scarring.
2. If pituitary infarction (Sheehan's syndrome) is suggested, ovulation can be induced by exogenous administration of FSH and LH (e.g., Pergonal). However, women with this syndrome will exhibit pan-hypopituitarism and require continuous hormone replacement therapy (esp. estrogen and cortisone).
3. If the secondary amenorrhea is due to an underlying chronic disease (e.g., hypothyroidism), this disease should be treated first, as the menses usually return when the condition is corrected.
4. If primary gonadal failure is indicated (e.g., by elevated FSH and LH), hormone replacement therapy will be necessary

42. Secondary Infertility: 30 year-old Joyce had a successful term pregnancy 3 years ago. In spite of not using any contraception she has been unable to get pregnant again. She desperately wants a child and comes to your office.

Definitions:

- (i) *Infertility* is a couple's failure to conceive after 1 year of unprotected intercourse. This happens to around 15% of reproductive-aged couples in the US.
- (ii) *Primary* infertility means the couple has never conceived [see case 36 for more details]
- (iii) *Secondary* infertility means they have in the past, they just can't now (with the obvious question being "what changed?")

Approach:

- Dr. Steinkampf (of Reproductive Endocrinology) approaches infertility by saying there could be something wrong with the ovary, the egg, the tubes, the uterus, or the sperm.
- Our book divides it into anovulation, anatomical defects in the female genital tract, and abnormal spermatogenesis.

Workup

- A. Initial evaluation includes:
 - 1) History, looking for any obvious cause (PID, tubal ligation, etc.)
 - 2) basal body temperature chart - the temp will rise around 1 degree with ovulation (due to progesterone), then drop during menstruation. Serum progesterone can also be checked during the luteal phase to check for ovulation.
 - 3) Hysterosalpingogram (HSG) - Done in the radiology suite. Dye is injected into the uterus, fluoroscopy is performed and pictures are taken, looking for uterine abnormalities (septate or bicornuate or unicornuate or fibroids, etc) and for patent fallopian tubes ("fill (of the uterus and tubes) and spill (of the dye out of the ends of the tubes)"). Incidentally, HSG's using oil-based contrast may actually increase fertility, apparently by flushing the tubes, making it easier for the egg to make it.
 - 4) Semen analysis - the least popular part of the workup for the men. Looking for adequate volume of ejaculate, good numbers of sperm, with good motility. (like to have >20 million/mL w/ at least 60% motile sperm)
- B. If all of these are normal other tests can be performed, including diagnostic laparoscopy, looking for endometriosis/adhesions/ anything else that might be wrong. More advanced testing includes postcoital cervical mucous testing.

Management:

- A. Anovulation -
 - Ovulation may be induced. Clomiphene citrate is usually tried first. This is an antiestrogen at the hypothalamic and pituitary levels, inducing increased FSH. This leads to increased follicular activity.
 - If this doesn't work, FSH can be given. Both of these increase the risk of multiple gestation and of hyperstimulated ovaries (which get swollen and tender).
- B. Anatomic
 - Adhesions, blocked tubes, and uterine abnormalities can, at times, be corrected surgically. IVF and other advanced fertility techniques are also an option.
- C. Spermatogenesis
 - Clomiphene can help 20% of the time.
 - If unsuccessful, artificial insemination with donor sperm or assisted techniques (such as GIFT and IVF with ICSI – intracytoplasmic sperm injection) can be tried

Section III: Gynecologic Oncology**2. Abnormal Pap Smear: Your office nurse shows you the PAP smear report on 40 year-old Harriet, G3 P3. It is consistent with moderate dysplasia.****Definitions:**

1. PAP smear: Developed in 1940 by George Papanicolaou to examine single-cell morphology based on an exfoliative cell specimen scraped from the cervix at the time of routine pelvic exam. Its accuracy depends on the following:
 - (i) the degree of cervical inflammation and concomitant infection (which may obscure dysplastic changes)
 - (ii) adequacy of the specimen obtained (need endocervical cells)
 - (iii) expeditious fixation of the smear to avoid drying artifact.
 - (iv) The most accurate samples are obtained by using both the spatula and endocervical brush
2. Cervical carcinoma: considered a "controllable" cancer because--
 - (i) it has an identifiable precursor lesion (CIN) with a natural history of slow progression to frank cancer
 - (ii) there is a cheap and noninvasive screening test (Pap smear) and follow-up diagnostic procedure (colposcopy)
 - (iii) there are simple and effective treatments of the precursor lesion (cryotherapy, laser ablation, LEEP excision, and cold knife cone biopsy) with high cure rates.

Pathophysiology:

- The squamocolumnar junction and transformation zones of the cervix are the sites where neoplastic changes are most likely to take place, and these are the areas sampled by the Pap smear.
- As the uterus and cervix grow during puberty and adolescence, the squamocolumnar junction (SCJ) everts from its position just inside the cervical os to become visible on the cervical surface. It is fleshy, and appear as an erosion.
- This area is exposed to vaginal secretions, irritants, and a changing hormonal environment, and the process of squamous metaplasia begins as a new squamocolumnar junction is formed farther in from the old one. Since this is an active area of cell turnover and division, it is more susceptible to neoplastic changes.

Epidemiology and Screening:

- (i) In the 1930's, the death rate for cervical CA was ~6x that for ovarian CA. With the advent of the PAP smear, this has steadily fallen, and the death rate from Cervical CA is now less than that for Ovarian CA.
- (ii) Risk factors for cervical neoplasia:

- <u>Early intercourse</u>	- <u>immunocompromise</u>
- <u>Multiple sex partners</u>	- <u>cigarette smoking</u>
- Early childbearing	- intrauterine DES exposure
- <u>'high-risk' sex partners</u>	- <u>HPV</u> (types 16,18,31,33)
- socioeconomic status, race	- venereal infection, HIV
- (iii) The average age at diagnosis of cervical cancer the 16,000 new cases annually is 50 years old.
 - It is presumed that the precursor CIN precedes invasive CA by about 10 years, but in some patients, precursor CIN did not exist at all.
 - 85% of cervical CA is squamous cell, 15% is adenocarcinoma (arising from the endocervical glands)
 - Other rare types: clear cell CA (in utero DES exposure), sarcoma, and lymphoma.
- (iv) Screening intervals:
 - Pap smears should be obtained at the age of onset of sexual activity or by the age of 18.

- Some experts recommend annual Paps, but others suggest that low-risk patients who have become sexually active after age 25 and have had only one sexual partner, may have intervals increased to 3 years after three consecutive normal paps.
- Approximately 1 to 10% of PAP smears will be abnormal

Classification and Staging:

1. PAP Smears

There are three systems of classifying pap smears: the class system, the CIN system, and the most recent Bethesda system. The basis for these systems is the likelihood of the progression of precursor lesions to more advanced degrees of neoplasia and perhaps carcinoma. By looking at the cells themselves and assessing the nuclear: cytoplasmic ratio, the degree of chromatin staining, and other cellular characteristics, pathologists place the smear into one of the descriptions below:

Class System	Class I (normal)	Class II Inflammation	Class III		Class IV severe dysplasia or CIS	Class V suggestive of CA or CIS
			Mild dysplasia	Moderate dysplasia		
CIN System	Normal	Inflammatory	CIN I or	CIN II	CIN III	Suggestive of cancer
Bethesda System	Within normal limits	Inflammatory a. w/o atypia	Low Grade SIL	High grade SIL		Squamous cell cancer
		b. with atypia or changes assoc. w/ HPV				

2. Cervical Carcinoma: **CLINICAL** staging involves histologic assessment of tumor sample, physical exam, and lab studies (IVP, cystoscopy, proctosigmoidoscopy, barium enema, LFTs, renal function)

Stage I:

- CA is strictly confined to the cervix
- 91% 5 year survival

Stage II:

- CA extends beyond cervix but has not extended to pelvic wall; or, involves vagina but not as far as lower third
- II_A (83% 5 year) No obvious parametrial involvement
- II_B (68%) Obvious parametrial involvement

Stage III

- CA has extended to pelvic wall; lower third of vagina; hydronephrosis
- III_A (45% 5 year) No extension to pelvic wall, but lower third vagina involved
- III_B (36%) Extension to pelvic wall, hydronephrosis

Stage IV

- CA has extended beyond true pelvis or involves bladder or rectal mucosa.
- IV_A (15% 5 year) Spread to adjacent pelvic organs
- IV_B (2% 5 year) Distant metastasis

Procedures:

1. Colposcopy: (diagnostic)

- A colposcope is a sophisticated binocular stereomicroscope that can view small, often subtle dysplastic change on the cervix. During colposcopy, acetic acid is placed on the surface of the cervix to make dysplastic areas turn white.
- Criteria such as white epithelium, abnormal vascular patterns such as mosaicism, and punctate lesions help identify suspicious areas that may then be biopsied.

- After sampling the colposcopically identified lesions, ECC is performed where a sample of the endocervix is taken and evaluated for lesions. ECC will be positive for dysplasia in 5-10% of women with a dysplastic Pap.
- 2. Cervical conization: (diagnostic and potentially therapeutic)
 - This involves taking a cone shaped biopsy of the cervix for either diagnostic or therapeutic purposes.
 - It is a minor surgical procedure performed with scalpel and scissors (or with laser or heated wire loop [LLETZ-large loop excision of the transformation zone]). This procedure takes a more extensive specimen and allows the pathologist to fully ascertain the extent of disease.
 - Some situations mandate diagnostic conization:
 - 1) Unsatisfactory colpo--cannot visualize the entire SCJ
 - 2) Positive ECC mandates conization with clear margins
 - 3) Discrepant Pap smear and biopsy results
 - 4) Microinvasion/CIS on biopsy
- 3. Cryocautery: (therapeutic)
 - Used to treat low grade CIN, it uses a mushroom tipped stainless steel probe supercooled with liquid N₂. It involves a 3-min freeze, a 5-min thaw to allow edema to set in, and a second 3 min freeze to extend the damaged area deeper.
 - Cure rates for low grade CIN = 90%
- 4. Laser therapy: (therapeutic)
 - Can also be used for high-grade lesions as well as low grade, but it has cure rates similar to cryo.
- 5. Follow up for patients who have been treated for CIN:
 - Pap smear in 3 months, then q3 month Paps for 1 year, then q6 month Paps for the 2nd year.
 - If the Paps are then normal, she may resume having annual Paps.

Management:

A. PAP Smears (based on Bethesda system)--

1. Atypical Squamous Cells of Undermined Significance (ASCUS)
 - (i) Repeat Pap smear every 4-6 months for 2 years until there are three consecutive neg. smears; if a second ASCUS is obtained, colposcopy should be considered
 - (ii) If the Pap report of ASCUS is qualified by severe inflammation, any specific infection should be treated, and the Pap repeated in 2-3 mos.
 - (iii) ASCUS in a postmenopausal patient should be followed by a course of vaginal estrogen and a repeat Pap; if the Pap is still abnormal, colposcopy should be considered.
 - (iv) If the Pap report of ASCUS is qualified by a statement favoring a neoplastic process, the Pap should be managed according to the degree of dysplasia suggested.
 - (v) If the patient is at high risk for dysplasia, consider colposcopy
2. Low-Grade Squamous Intraepithelial Lesion (LGSIL)
 - (i) 65% of LGSIL will revert spontaneously; 20% stay as is; 15% progress
 - (ii) Repeat Pap smear every 4-6 months for 2 years until there are 3 consecutive neg. smears; if a second abnormality is obtained, colposcopy should be considered
 - (iii) Colposcopy with endocervical curettage (ECC) and directed biopsies
3. High-Grade Squamous Intraepithelial Lesion (HGSIL)
 - Colposcopy with endocervical curettage (ECC) and directed biopsies
4. Atypical Glandular Cells of Undetermined Significance (AGCUS)
 - The Pap smears subsume a group of situations from exuberant benign reactive changes to adenocarcinoma in situ; each case must be individualized by clinical situation and risk factors
 - Management options--
 - (i) Repeat Pap, using endocervical brush
 - (ii) Endometrial biopsy
 - (iii) Cone biopsy

B. Cervical Carcinoma--

1. Radical surgical therapy (radical hysterectomy, node removal) is implemented with invasive I and IIA.
2. Radiation therapy--(both intravaginal and external pelvic) reserved for patients with Stage I or IIA who are poor surgical candidates and for all patients with more advanced disease Stage IIB, III/IV.
 - Note that although cervical CA is relatively *insensitive* to radiation, high cure rates can be obtained with Stage I and II disease because the female anatomy allows direct implantation of a radiation source in the tumor (brachytherapy).
3. Follow-up for patients with cervical CA is done for at least 5 years, as most recurrences (90%) happen in this 5 year period.

Note: HIV infection can initially present as cervical CA

22. Ovarian Cancer : 54 yo Joan, G2 P2, comes to your office complaining of abdominal enlargement and bloating. Abdominal exam reveals shifting dullness, pelvic exam reveals diffuse masses.

Incidence:

1. Ovarian CA is the leading cause of death attributable to GYN cancers in the US
2. 12/1000 women will develop the disease, only 2-3 of the 12 will be cured
3. Incidence rises in the 5th decade and continues until the 8th decade. The postmenopausal pt is at greatest risk
4. Ovarian CA is silent in its early development. In 70% of the cases, the dz has spread beyond the pelvis by the time the dx is made
5. There exists no dependable screening test other than periodic pelvic exams. CA125 CANNOT serve as a cost efficient screening test.
6. Patients must have annual pelvic exams during the postmenopausal years in order to detect ovarian enlargement.

Risk Factors:

1. white
2. nulliparous
3. late menopause
4. family hx
5. prolonged intervals of uninterrupted ovulation

Pathophysiology:

1. Categorized according to site of origin
 - a. Epithelial (85%) - most common is *serous* cystadenocarcinoma
 - b. Sex cord stromal
 - c. Germ cell
 - d. Non-specialized stromal
 - e. Metastatic
2. Modes of spread
 - a. primarily via seeding through the peritoneal cavity due to sloughing from the ovarian surface and is spread within the peritoneal fluid
 - b. distribution can follow circulatory path of flow (posterior cul de sac – R. paracolic gutters- R. hemidiaphragm - liver capsule - omentum)
 - c. lymphatic dissemination to pelvic and periaortic nodes in advanced disease
 - d. blocks diaphragm lymphatics causing ascites
 - e. As a terminal event, bowel obstruction caused by massive serosal involvement is common
 - f. Death usually occurs as a result of progressive encasement of abdominal organs causing anorexia, vomiting, and inanition.

Differential Diagnosis:

1. ovarian cancer
2. other malignancy (breast, liver)
3. benign cyst/benign ovarian neoplasm

4. tubo-ovarian abscess
5. endometriosis
6. pelvic or horseshoe kidney

History:

- symptoms/signs are often nonspecific
- H/O?
 - 1) irregular menses
 - 2) mass effects of the bladder or rectum such as urinary frequency or constipation
 - 3) lower abdominal or pelvic fullness - usually a late manifestation caused by the tumor or ascites
 - 4) dyspareunia
 - 5) pain(rare) secondary to torsion, rupture, hemorrhage
 - 6) abdominal distention is often the presenting c/o (caused by ascites)
 - 7) weight loss

Physical Exam:

- Early detection requires frequent pelvic exams, especially after 40yo; solid, fixed pelvic masses are suggestive.
- If ascites and upper abdominal masses are present, ovarian CA is most likely

Workup:

- (i) Pap smear, endocervical curettage, endometrial Bx to R/O other malignancies
- (ii) Barium enema to R/O colon CA with ovarian mets
- (iii) Mammogram to R/O primary breast CA
- (v) Pelvic US to characterize the mass
 - a. uniloculated usually functional cysts, multiloculated usually CA
 - b. 95% of ovarian CA are >5cm
 - c. Multicystic with solid components and free fluid in the cul de sac are suggestive of CA
- (vi) CA125 levels- elevated in 85% of the patients with ovarian CA - used to follow course of dz
- (vii) Surgical Evaluation:
 - a. Exploratory laparotomy through a vertical abdominal incision allowing an evaluation of the upper abdomen. **Absolutely necessary for proper staging**
 - b. Total abdominal hysterectomy with BSO (see "g")
 - c. Peritoneal washings from the pelvis and upper abdomen
 - d. Inspection of all peritoneal and diaphragmatic surfaces
 - e. Sampling of pelvic/obturator and para-aortic lymph nodes
 - f. Omentectomy
 - g. A wedge biopsy of the contralateral ovary to exclude occult disease in young women who wish to preserve fertility and who have an ovarian cancer apparently confined to one ovary

Staging:

1. Stage I: Limited to the ovaries
 - a. Stage 1A
 - Limited to one ovary; no malignant ascites
 - No tumor on the external surface; capsule intact
 - b. Stage 1B
 - Limited to both ovaries; no malignant ascites
 - No tumor on the external surface; capsule intact
 - c. Stage 1C
 - Tumor either stage 1A or 1B but with malignant ascites present or with positive peritoneal washings or with capsule(s) ruptured
2. Stage II: Involvement of one or both ovaries with pelvic extension
 - a. Stage IIA: Extension or metastases to the uterus or tubes or both
 - b. Stage IIB: Extension to other pelvic tissues
 - c. Stage IIC: Tumor either stage IIA or IIB but with malignant ascites present or with positive peritoneal washings or with capsule(s) ruptured

3. Stage III: Involvement of one or both ovaries extension into the peritoneal cavity and/or (+) retroperitoneal or inguinal nodes; superficial liver mets; tumor limited to the true pelvis but histologically proven malignant extension to the small bowel or omentum.
 - a. IIIA: Microscopic (+) washings; (-) nodes
 - b. IIIB: tumor < 2cm; (-) nodes
 - c. IIIC: tumor > 2cm and/or (+) nodes
4. Stage IV: Involvement of one or both ovaries with distant metastases (e.g., the parenchyma of the liver); if pleural effusion present, there must be (+) cytological test results to deem stage IV

Treatment:

1. Early stage :
 - a. TAH/BSO/infracolic omentectomy/ascitic fluid or peritoneal washings/peritoneal bx
 - b. IA, grade 1 tumor confined to ovaries - no further tx
 - c. IA, grade 2 or 3- further tx with chemo
2. Advanced stage:
 - a. remove as much tumor as possible (debulking).
 - b. Reduction of residual dz to < 1 at each location is considered optimal debulking.
 - c. Accomplish this by TAH/BSO/omentectomy/bowel resection (if needed for optimal debulking) / removal of all resectable dz.
3. Chemo Tx: follows debulking sx for advanced stage and early stage dz with poorly differentiated tumors
 - a. standard taxol (Paclitaxel) with cis or carboplatin
 - b. carbo-platinum if renal neurotoxicity are too great from cis platinum
 - c. usual duration of tx is 6 courses, 3 weeks apart.
4. Second laparotomy:
 - a. Done in some patients clinically free of disease following 6 courses of chemotherapy to attempt to restage and treat appropriately.
 - b. This second look is of unclear benefit (*currently* only part of experimental protocols)
5. Whole abdominal radiation:
 - a. has been used in patients with only microscopic disease following surgery.; does have a role in patients with no gross residual disease following initial rx.
 - b. The efficacy of radiation + chemo has not been properly investigated at this time.

Prognosis:

1. stage 1 - 80-95% 5 yr. survival
2. stage 2 - 70% 5 yr. survival
3. advanced stage - 20% 5 yr. survival
4. negative 2nd look - 60% 5 yr. survival

46. Trophoblastic Disease: You recently performed a D&C on 28 year-old Darlene, G2 P1 now Ab1, 10 weeks gestation by dates. The gross findings were consistent with a molar pregnancy. The path report confirms your suspicion.

Definitions:

1. Gestational trophoblastic disease (GTD) is characterized by tumors that arise from the proliferation of placental trophoblast. It produces a distinct hormone marker, human chorionic gonadotrophin (hCG). It was the first solid tumor to respond to chemotherapy, and the cure rate approaches 100%.
2. Classification--
 - (i) Hydatidiform mole (molar pregnancy)
 - a. Complete, or classic
 - b. Incomplete, or partial
 - (ii) Gestational trophoblastic neoplasia (GTN)
 - a. Nonmetastatic
 - b. Metastatic
 - Low risk (good prognosis)
 - High risk (poor prognosis)

Pathophysiology:

1. Benign Gestational Trophoblastic Disease:
 - (i) Complete (classic) mole:
 - Accounts for 95% of hydatidiform moles
 - 20% of complete moles will lead to persistent disease.
 - 46, XX karyotype with both genes being of paternal origin as a result of duplication of a 23 chromosome haploid sperm in an empty ovum.
 - 3-13% of complete moles are 46, XY from *dispermic* fertilization of an empty ovum. A 46, YY conceptus is not viable.
 - Dispermic complete moles has a 4-fold increase in residual gestational trophoblastic disease compared with monospermic moles.
 - (ii) Partial moles:
 - 5% of hydatidiform moles
 - Commonly have a triploid (69-chromosome) karyotype.
 - A normal haploid (23, X) ovum undergoes dispermic fertilization to form a 69, XXY (70%), 69, XXX (27%), 69, XYY (3%) conceptus.
 - 5% of partial moles will lead to persistent disease.
2. Gestational trophoblastic neoplasia (GTN)
 - (i) malignant GTD, which arises from trophoblastic elements of the developing blastocyst, retains the invasive tendencies of the normal placenta, and remains able to secrete hCG.
 - (ii) GTN can be either metastatic or nonmetastatic. These include invasive moles, placental trophoblastic tumors, and choriocarcinoma.

Incidence:

1. Benign GTD occurs in 1 of 1200 pregnancies in the U.S. and up to 1 of 120 pregnancies in other parts of the world (e.g. East Asia).
2. Malignant GTD, develops in 20% of moles, occurs in 1 of 20,000 pregnancies in the U.S. and may follow:
 - a. Hydatidiform mole (25%)
 - b. Normal pregnancy (50%)
 - c. Spontaneous abortion or ectopic pregnancy (25%)

Risk factors:

1. Maternal age
 - Increased risk in women over age 35
 - Risk is 5X greater in women over age 40
 - Risk may be increased in teenagers

2. Previous molar pregnancy: 10X increase in risk of having a subsequent mole.

Signs and symptoms:

1. *Pregnancy-induced hypertension* in the first-half of pregnancy is virtually diagnostic of a mole.
2. *Hyperthyroidism* is secondary to the high level of hCG, which behaves like TSH.
3. *Bleeding* occurs in 90% of cases in the first trimester and may be accompanied with the *passage of vesicular tissue*.
4. *Uterus may be larger, smaller, or expected size* in terms of the last menstrual period.
5. *Nausea and vomiting* occur in about 1/3 of pts.
6. *Abdominal pain* secondary to theca-lutein cysts is found in 15% of pts because the molar pregnancy produces excessive hCG, which stimulates excessive growth of the ovaries.

Workup:

1. Complete history and physical
2. Ultrasound (may see a “**snow storn**” pattern if complete mole)
3. Measurement of serum hCG level (>100,000 mIU/ml for molar pregnancies)
4. Hepatic, renal, and thyroid function tests

Treatment:

1. Benign Disease:
 - (i) Preferred method of treatment is evacuation of the uterus by suction and curettage. Hysterectomy is an alternative in selected patients who have completed childbearing.
 - (ii) Follow-up:
 - a. Weekly measurements of serum hCG levels until levels are normal for 6 consecutive months.
 - b. If levels plateau or rise during the 6 month interval, patient should be evaluated for metastasis (Virtually all episodes of malignant sequelae occur within 6 months of evacuation).
 - c. Patient must use effective contraception for the entire interval of hormonal follow-up.
2. Gestational Trophoblastic Neoplasia (GTN)
 - (i) Non metastatic disease: has features of hydatidiform mole, but edematous chorionic villi persist with invasion into the myometrium and continue to produce hCG. Rarely metastasize.
 - a. First-line therapy is methotrexate. Since MTX is secreted by the kidney, urine creatinine levels must be normal before each treatment. LFT's must also be checked since it is metabolized by the liver. Patients whose levels of hCG plateau or rise during therapy should be switched to alternative therapy.
 - b. Alternative therapy: actinomycin-D or etoposide
 - c. Early hysterectomy shortens the duration and amount of chemotherapy needed to produce remission.
 - d. Failure of alternative therapy or the appearance of new metastasis mandates the use of multiagent chemotherapy (epoposide, MTX, actinomycin-D, cyclophosphamide, vincristine).
 - (ii) Metastatic disease
 - a. Assign risk from WHO scoring system
 - b. Low risk: single agent chemotherapy
 - c. High risk: Multiagent chemotherapy
 - (iii) Risk for choriocarcinoma is 2-19% for women with a molar pregnancy.
 - (iv) Diagnostic Evaluation for metastatic disease: (performed if hCG levels either plateau or continue to rise)
 - a. Chest X-ray
 - b. Ultrasound or CT of abdomen, CT of head, and pelvis
 - c. Angiography of selected pelvic organs in selected cases
 - (v) Common sites of metastasis:

- Lung:	80%
- Vagina: (do not biopsy)	30%
- Pelvis:	20%

- Brain: 10%
- Liver: 10%
- Bowel, kidney, spleen: < 5%
- Other: 10%

(vi) Staging of GTN:

Stage I: limited to uterus (100% cure rate)

Stage II: extends outside the uterus, limited to the genital structures (88% cure rate)

Stage III: extends to the lungs (90% cure rate)

Stage IV: all other metastatic sites (40% cure rate)

Section IV: Infectious Disease

40. Salpingitis: E.R. calls you to see 21 year-old Michelle, G0 P0 complaining of severe pelvic pain. She has a 103 °F fever with exquisite tenderness to cervical motion.

Definition:

- Salpingitis is an inflammation of the fallopian tubes.
- PID makes up a spectrum of inflammatory disorders of the upper genital tract, including salpingitis, endometritis, tubo-ovarian abscess and pelvic peritonitis.

Pathophysiology:

- Sexual activity is responsible for moving organisms from the lower genital tract to the upper genital tract. Current evidence supports a multibacterial etiology of Acute PID.
- Organisms often involved are *Neisseria gonorrhoeae*, *Chlamydia trachomatis*, *Mycoplasma hominis*, *Ureaplasma urealyticum*, *Actinomyces israelii* (especially if an IUD has been present several years), anaerobic bacteria and facultative gram-negative rods.

Differential Diagnosis:

1. Acute Appendicitis
2. UTI
3. Adnexal torsion
4. Endometriosis
5. Bleeding corpus luteum
6. Ectopic pregnancy
7. Ruptured ovarian cyst
8. Inflammatory bowel disease
9. Degenerating fibroids
10. Spontaneous abortion
11. Diverticulitis

History:

- The usual history as for any STD is useful. Know that acute PID can be aggravated by menses, sexual intercourse, strenuous physical activity and even a pelvic exam.
- Common Presenting Complaints:
 - 1) Lower quadrant pain, often bilateral
 - 2) Recent onset of menses (esp. with chlamydial and gonococcal infections)
 - 3) Dysuria
 - 4) Purulent vaginal discharge
 - 5) Nausea and/or vomiting
 - 6) Fever and shaking chills

Physical Exam:

- Patient is usually febrile and tachycardic with normal BP. There is generalized lower abdominal tenderness w/o palpable masses.
- On spec exam, there may be purulent discharge.
- On bimanual exam, *cervical motion tenderness* and *bilateral adnexal tenderness* are present without masses.

Workup:

- 1) Pregnancy test - r/o ectopic
- 2) CBC - neutrophil leukocytosis indicates acute infection (not totally reliable since less than 50% of cases will have WBC > 10,000)
- 3) ESR - elevated
- 4) Urinalysis - r/o UTI
- 5) Cervical culture - esp. for Chlamydia and Gonorrhoeae
- 6) Culdocentesis - secondary test; if purulent fluid obtained, culture will assist in choice of abx.
- 7) Pelvic Ultrasound - may help define adnexal masses or IUD intrauterine or ectopic pregnancy.

- 8) Laparoscopy - if dz. Process is unclear, it is the ultimate way to establish diagnosis

Management:

- A. Hospitalization for acute salpingo-oophoritis (PID) is indicated in these situations:
- 1) Dx is uncertain
 - 2) Surgical emergencies (i.e. Appendicitis or ectopic) are to be ruled out
 - 3) Pelvic abscess is suspected
 - 4) Severe illness precludes outpatient management
 - 5) Patient is pregnant
 - 6) Patient is unable to tolerate or follow outpatient management
 - 7) Patient failure to respond to outpatient management
 - 8) Clinical follow-up after 48-72 hr. of antibiotic therapy cannot be arranged. *If patient shows no response in this time frame, surgery must be considered.*
 - a) HIV ⊕
- B. Outpatient Treatment Options:
 Cefoxitin 2.0 gm IM, with probenecid 1gm PO or
 Ceftriaxone 250 mg IM
 plus Doxycycline 100 mg PO bid for 10-14 days

43. Sexually Transmitted Diseases: 21YO Trudy, G0 P0, presents to your office complaining of exquisitely tender vulvar lesions. On pelvic examination you confirm her findings. You also note periurethral, vaginal, and cervical ulcerative lesions. Inguinal nodes are palpable and tender bilaterally. Temperature is 101.2 F.

Differential Diagnosis: consists of STDs that cause genital lesions

Most likely cause--

1. **Herpes genitalis** (85% HSV2)
 - a. Symptoms:
 - (i) prodromal phase of mild paresthesias and burning in affected areas several days before outbreak of vesicles
 - (ii) dysuria from exquisitely painful vulvar lesion may cause urinary retention
 - b. Signs:
 - (i) painful vesicular lesions, that lyse and progress shallow, painful ulcers with a red border found on vulva, vagina, cervix, perineal, and perianal skin that resolve within 5 to 10 days.
 - (ii) Primary infections also characterized by malaise, low grade fever, and inguinal adenopathy in 40% of pt's
 - c. Dx:
 - (i) viral cultures taken by swab of a lesion, is most sensitive, comes back in < 48hrs
 - (ii) smears with Wright's stain to see giant cells with acidophilic intranuclear inclusion bodies
 - d. Management:
 - (i) directed towards management of local lesions and symptoms
 - (ii) Sitz baths, diluted Burow's solution, and topical anesthetics may be used for symptoms
 - (iii) topical abx for secondary infection (Neosporin)
 - (iv) oral Acyclovir (200mg TID increased to 5x/day with lesions) can be used in pt's frequent recurrences
 - (v) hospitalization for IV Acyclovir may be required for severe outbreak, encephalitis or immunocompromised pt's
 - (vi) warn pt of need for c/s in case of lesions during delivery, to prevent perinatal infection of baby
 - (vii) 30% of pt's develop recurrences, but are usually milder and of shorter duration

Other possible causes--

2. **Chancroid** (*Haemophilus ducreyi*)
 - a. Symptoms:

- (i) painful soft chancres, foul smelling with grayish base (papule/pustules) on vulva
- (ii) usually 1-3 in number
- (iii) duration of weeks
- b. Signs: tender lymphadenopathy
- c. Dx: cx and gram stain smears
- d. Tx: Erythromycin 500mg QID for 10 days
- 3. Primary Syphilis (*Treponema pallidum*)
 - a. Symptoms/lesion:
 - (i) a single, *usually painless*, chancre appears at site of primary entry of organism 10-60 days after infection (@ vulva, vagina, cervix, anus, rectum, pharynx, lips, fingers), healing spontaneously within 3-9wks)
 - (ii) Signs: firm nontender adenopathy
 - b. Dx:
 - (i) Spirochetes seen on darkfield microscopy
 - (ii) Serology VDRL, RPR, usually negative during primary infection
 - c. Tx:
 - (i) PCN G, Tetracycline, or Erythromycin pregnant pt's
- 4. Granuloma inguinale
 - a. Symptoms/signs:
 - (i) single or multiple red papules with pseudoadenopathy that ulcerate
 - (ii) rare to cause pain
 - (iii) advanced stage characterized by fibrosis, scarring, and keloid formation
 - b. Dx:
 - (i) by tissue smears. Donovan bodies (=encapsulated bipolar staining bacterium of reddish color found within large mononuclear cells) seen with Wright or Giemsa stain
 - c. Tx: Tetracycline 500mg q6 for 3wks
- 5. Lymphogranuloma venereum (*Chlamydia trachomatis*)
 - a. Symptoms/Signs:
 - (i) generalized malaise, HA, and fever
 - (ii) painless vulvovaginal vesicle/ulcer, progresses to buboes
 - (iii) tender, suppurative nodes
 - b. Dx: clinical, complement fixation test for antibodies
 - c. Tx: Tetracycline 500mg q6 for 3wks
- 6. Molluscum contagiosum (*Poxviridae*)
 - a. causes raised papules with waxy core, dx by presence of inclusion bodies
 - b. treated with dessication, cryotherapy, curettage
- 7. Parasites (Scabies)- can cause genital lesions
 - a. causes intense itching
 - b. treated with Lindane 1%
- 8. HPV- painless condylomas, treated with cryotherapy, or trichloroacetic acid

History:

- take thorough sexual history
- ask about signs and symptoms listed above, ask about symptoms of vaginal discharge as relates to Chlamydia, Gonorrhea, Candida, Trichomonas etc.
- 20-50% of pt's have at least one more coexisting STD infection

P.E. & Work Up:

1. do thorough pelvic exam, look for lesions, vaginal discharge. Inspect perineum and perianal areas, inspect inguinal region for rashes, lesions, and adenopathy; for completeness inspect oral cavity and cervical nodes.
2. obtain cultures (for GC and Chlamydia), HSV culture if ulcers present, RPR
3. wet prep (KOH whiff test +, and clue cells for BV), KOH prep of Candida hyphae

Management:

1. treat underlying causes, as stated above

- (i) Flagyl for concomitant Trichomonas or Bacterial vaginosis
 - (ii) Ceftriaxone/or Doxycycline for Gonorrhea
 - (iii) Miconazole/Clotrimazole/or Butoconazole for Candida.
2. As with any STD, explain to pts the importance of safer sex, how their current practices have put them at increased risk for other STDs such as HIV, HepB, and HepC, (and recommend that they be tested for these); also emphasize the communicable nature of these diseases, and that it is imperative that any of their partners must also be treated to break the cycle of reinfection

Section V: Prenatal Care**3. Anemia in Pregnancy: 19 year-old Anna, G2 P1, at 15 weeks gestation is found on routine prenatal CBC to have: hemoglobin 9.0, hematocrit 26.3, MCV 75, RDW 18.**

Definition: Anemia in pregnancy is generally defined as a hematocrit less than 30% or a hemoglobin less than 10.0 g/dL.

Pathophysiology:

1. During the course of pregnancy, there is a significant expansion of plasma volume more so than RBC mass. On average, there is a 1000 mL increase in plasma volume, but only a 300 ml increase in red cell mass. Thus, the HCT demonstrates a 'physiologic' decrease, but it is not actually an anemia. However, due to the monthly blood loss prior to pregnancy, and current dietary practices, women enter pregnancy on the verge of iron deficiency. When faced with plasma expansion plus the fetal nutritional requirements, mothers frequently fall into iron-deficiency anemia (over 90% of the anemias seen in pregnancy). Because it is so common, a trial of iron therapy is given to all anemic mothers prior to extensive workup.
2. Other causes of anemia in pregnancy include folate deficiency (due to nutrition or medications like dilantin, nitrofurantoin, pyrimethamine, or trimethoprim); mixed iron and folate deficiency; vitamin B12 deficiency (rare, but usually seen in women with malabsorption secondary to sprue, pancreatic disease, Crohns, ulcerative colitis, or surgical resection); hereditary hemolytic anemias (spherocytosis, glucose 6-phosphatase deficiency, pyruvate kinase deficiency); hemoglobinopathies such as sickle-cell and the thalassemias.

Workup:

1. Things to look for in the history:
 - a. nutrition
 - b. evidence of pica (ingestion of nonedible substances like starch, ice, dirt; more common in African-Americans and Hispanics)
 - c. a family history of hemolytic anemia or hemoglobinopathies.
2. Laboratory tests: (CBC, blood smear, Hg electrophoresis, reticulocyte count, serum iron, total iron binding capacity (TIBC), ferritin, serum folate/B12)
 - a. Iron deficiency:
 - (i) microcytic, hypochromic, low MCV, low serum iron
 - (ii) increased TIBC, low serum ferritin
 - b. Folate deficiency: hypersegmented neutrophils, high MCV
 - c. B12 deficiency: high MCV as well
 - d. Mixed Iron/Folate deficiency: normocytic/normochromic
 - e. Hereditary hemolytic anemias: look for spherocytes, etc.
 - f. Hemoglobinopathies:
 - (i) Thalassemia trait = microcytic, hypochromic, but normal iron and TIBC, high HbA2.
 - (ii) HbSS/SC/Thalassemias = look for sickle cells, target cells, diagnosis requires electrophoresis.

Management of Anemias:

1. Iron deficiency: This is always assumed to be the cause, and a trial of iron therapy (325 mg FeSO4 bid) is given, with an increase or at least stabilization of Hct. Parental Fe may be necessary for management of severe Fe deficiency anemia
2. Folate deficiency: Treated with 1 mg folate qd; or removal of competing medications.
3. B12 deficiency: Treated with parenteral vit. B12
4. Hemoglobinopathies: Conservative management (hydration, oxygen, analgesia)
 - Transfusions are reserved for complications of hemoglobinopathies (congestive heart failure, sickle-cell crises, and severely low levels of hemoglobin. It should also be noted that women with sickle-cell disease are incline to maternal UTIs, so watch for these.

6. Discrepant Fundal Size: 38 year-old Emma, G5 P1 Ab3, is referred to you for evaluation at 32 weeks gestation by dates. (a) Her fundal height is 27 cm. (b) Her fundal height is 40 cm.

A. 27 cm FH @ 32 weeks gestation.

Definition:

- Intrauterine growth retardation (IUGR) is fetal or neonatal weight below the tenth percentile for a given gestational age.
- These infants are at an increased risk for perinatal morbidity and mortality, being prone to such problems as meconium aspiration, asphyxia, polycythemia, hypoglycemia, and mental retardation.
- Historical Data:
 - Previous poor pregnancy outcome: previous IUGR baby/fetal or neonatal demise
 - significant antenatal hemorrhage in either the 2nd or 3rd trimester
 - multiple fetuses
 - chronic hypertension or significant medical disease
 - Smoking > 10cig/day, alcohol/drug abuse

Etiology:

1. Causes
 - a. Maternal substrate availability problems:
 - poor nutrition
 - cigarette smoking
 - drug abuse/teratogenic drugs
 - cyanotic heart disease
 - pulmonary insufficiency
 - b. placental transfer problems
 - essential hypertension
 - chronic renal disease
 - PIH
 - c. Fetal inadequate usage of substrate
 - intrauterine infection
 - congenital anomalies/congenital abnormalities
2. Symmetric IUGR
 - a. occurs before 16 weeks and involves inadequate growth of both the head and the body. Usually associated with early and more severe disturbances
 - b. most commonly associated with infections or congenital fetal anomalies including trisomies and NTD, also heavy drug use.
3. Assymmetric IUGR
 - a. occurs later in pregnancy after 32 week.
 - b. Brain size is spared so the head size is proportionally larger than the abdominal size. BPD is normal – relative sparing of the head and long bones at the expense of liver, muscle, subcutaneous stores
 - c. caused by uteroplacental insufficiency
 - maternal factors: PIH and eclampsia, renal disease, hemoglobinopathies, lupus, and heart disease.
 - Uterine factors: morphologic abnormalities
 - Placental factors: infarcts, thrombosis, partial abruption, previa, or multiple gestation

Diagnosis:

- The first step in diagnosis would be to recheck her dates and determine previous regularity and her knowledge of her last menstrual period.
- It is also important to know her previous fundal heights.
 - If the fetus is still small for dates the next step would be an ultrasound. Ultrasound is indicated whenever the fundal height lags more than 4cm behind a well established gestational age, or whenever the mother has a well established high risk condition.

- Ultrasound criteria to diagnosis IUGR: either a 3 week or more discrepancy between GA and abdominal circumference or an EFW < 10% for gestational age

Management:

1. If IUGR is diagnosed efforts should be taken to modify associated factors such as cessation of smoking and improved nutrition. Bed rest in the lateral position will increase uterine blood flow and may help improve nutrient delivery to the fetus.
2. Serial assessment:
 - a. Regular fetal monitoring with a NST or CST and possibly an OCT are the best way to assess the fetus
 - b. With IUGR < 10%: weekly testing with NST/CST is indicated along with ultrasounds for AFI
 - d. As long as NST is reactive and CST negative the pregnancy should be allowed to continue. Serial ultrasounds should also be done.
 - e. If the NST becomes nonreactive and the CST positive, in the presence of fetal lung maturity, delivery is indicated.
3. Delivery:
 - a. During labor these high risk patients must be monitored to detect earliest evidence of distress, since the fetoplacental unit does not have a normal reserve.
 - b. In the presence of recurrent abnormal fetal heart rate patterns, which are unresponsive to traditional treatment, delivery by C-section is indicated.
 - c. After birth the infant should be examined to rule out anomalies and infection.

B. Large for gestational age:**Differential Diagnosis:**

- Poor dates
- Macrosomia
- Polyhydramnios
- Multiple gestation
- Molar pregnancy

Management:

1. Poor Dates
 - As always the first step is to verify dates and make sure that the fundal height is actually bigger than it should be.
 - An ultrasound should be done next and would differentiate between other causes.
2. Macrosomia
 - Fetus weighing more than 4000g or is above the 90th percentile is considered to be excessive in size.
 - It may result from genetic determinants, maternal diabetes, or post-term gestation.
3. Polyhydramnios
 - There is an excess amount of amniotic fluid, usually greater than 2 liters. It is detected by ultrasound.
 - Complications include increased risk of pre-term labor, maternal respiratory discomfort, umbilical cord prolapse at rupture, and fetal malpresentation.
 - Causes include fetal anomalies like anencephaly, duodenal atresia, and tracheoesophageal fistula. (these impair fetal swallowing ability → ↓ uptake of fluid_
 - Hydrops: the fetus and placenta become edematous as a result of fetal CHF, hypoproteinemia, or hypoalbuminemia, resulting in transudation of placental fluid and possible increased production of fluid.
 - Ensure pt has negative antibody screen, negative syphilis testing, normal diabetes screen, and normal target ultrasound
4. Multiple Gestation
 - Detected by ultrasound
 - patient should be seen weekly starting during the mid-second trimester to be assessed frequently.
5. Molar Pregnancy

- Usually presents with bleeding and a greatly elevated beta-HCG.
- By ultrasound one would see a snowstorm effect or vesicular pattern.

11. Fetal Demise: 28 year-old Mary, G2 P1, at 30 weeks gestation (confirmed by a 15 week ultrasound) comes to L & D due to no fetal movements for 2 days.

Definition: fetal death after 20wks gestation, but prior to labor. Occurs in 1% of pregnancies.

Etiology:

1. idiopathic (50%)
2. HTN (5-20%)
3. erythroblastosis fetalis (3-15%)
4. congenital anomalies (5-10%)/chromosomal abnormalities
5. Intrauterine growth restriction
6. Postmaturity
7. DM/Vascular disease/chronic renal disease
8. Substance abuse
9. fetal or maternal infection
10. cord accidents
11. antiphospholipid antibodies

Workup:

- i) high clinical suspicion when pt reports no fetal movement, especially if uterus is small for dates
- ii) no fetal heart tones by Doppler
- iii) ultrasound confirms no movement or FHT's, collapse of fetal body with overlapping of cranial bones (Spalding's sign) b/c of brain liquefaction
- iv) abd x-ray: rarely indicated, gas in CV system w/in 3-4 days, Spalding's sign, angulation/curvature of spine
- v) amniocentesis: rarely indicated, dark brown turbid fluid with increased CPK
*pos. HCG does not r/o fetal demise b/c placenta may cont. to produce it for several wks.

Management:

- i) watchful expectancy- 80% of pt's have spontaneous labor w/in 2-3 wks of demise
- ii) induction of labor- indicated b/c of emotional burden of carrying fetus, possible infection, and 10% risk of DIC if fetus is carried for >5wks.
- iii) 12-24/25wks- use PGE₂ or half-dose PGE₂ and concentrated oxytocin (COP) for induction of labor
- iv) >24/25wks with favorable cervix- IV oxytocin (use of PGE₂ carries risk of uterine rupture).
- v) >24/25wks with unfavorable cervix- use of laminaria tents in cervical canal before oxytocin infusion may enhance cervical ripening.
- vi) monitor for coagulopathy- check weekly fibrinogen, hct, platelets, PT/PTT; fibrinogen <300mg/dl indicates consumptive coagulopathy.
- vii) emotional support
- viii) determine cause individualized but consider -TORCH studies; listeria cx; anti-cardiolipin ab fasting blood sugar; for congenital abnl get chromosomal analysis, total body radiography, and autopsy
- ix) subsequent pregnancies are managed as high risk

13. First Trimester Bleeding: 22 year old Sally, G1 P0, at 10 weeks gestation by dates comes to the ER complaining of vaginal bleeding.

Definitions:

Abortion termination of a pregnancy <20 weeks or a fetal weight of <500gms (this includes spontaneous and elective abortion)

Threatened Abortion Uterine bleeding without cervical dilatation. No expulsion of tissue at <20 wks

Inevitable Abortion Uterine bleeding with cervical dilatation. No expulsion of tissue at <20wks

Incomplete Abortion Passage of some products of conception through the cervix at <20 wks

Complete Abortion Spontaneous expulsion of all products of conception from the uterus at <20 wks

Missed Abortion Fetal death at <20 weeks without expulsion of tissue

Induced Abortion Intentional termination of pregnancy at <20 wks

Pathophysiology:

1. Approximately 20% of women bleed during the first trimester with a wide variation in the DDX. Approximately one-half to two-thirds of women who bleed from the uterus in the first trimester will miscarry or abort the fetus.
 - a. General maternal factors that increase spontaneous abortion
 - (i) Infections- rubella, Listeria monocytogenes, CMV, Treponema pallidum, Mycoplasma, and Toxoplasmosis, parvovirus, HSV
 - (ii) Environmental exposure- >20 cigarettes /day, and >7 standard alcoholic drinks per week
 - (iii) Psychological Factors
 - (iv) Systemic Disorders- DM, hypothyroidism, and SLE
 - (v) Local maternal factors-uterine abnormalities such as cervical incompetence, congenital abnormalities of the uterine fundus, and acquired abnormalities of the uterine fundus (submucous fibroids)
 - (vi) Advancing age
 - (vii) Previous history of miscarriage
 - (viii) Prolonged ovulation to implantation interval
 - b. Fetal Factors that increase spontaneous abortion
 - Genetic abnormality of the conceptus (most common cause for first trimester loss)
 - Chromosomal abnormalities account for about 50% of all miscarriages
 - c. Paternal Factors that increase spontaneous abortion
 - Immunologic relationship of the male and female may inhibit the normal development of the mother's ability to retain the antigenically foreign fetus without rejection. Treatment of this will allow a normal full-term pregnancy

Differential Diagnosis:

1. Threatened miscarriage
2. Ectopic pregnancy (usually presents with pain)
3. Vaginal and cervical lesions (vaginitis or cervicitis)
4. Endometrial infection
5. Increased friability of cervical tissue
6. Molar pregnancy
7. Sexual intercourse
7. Cervical/vaginal neoplasm
8. Physiologic bleeding: related to implantation

History:

- Quality of bleeding
- Quantity of bleeding (spotting vs. soaking)
- Onset and duration
- Pelvic pain
- Fever
- Drug history
- Smoking history
- Alcohol history
- Sexual history
- Parity
- Uterine surgeries
- Uterine abnormalities
- Incompetent cervix (in some patients it is the result of trauma and the rapid dilatation with tearing of fibers from a previous terminated pregnancy)

* The history given is inadequate since we know nothing about the bleeding or the duration. We should complete a complete sexual history including the date of last intercourse. A history of

any STDs would be helpful as would any PMH available. We also need a social and family history.

Physical Exam:

1. Assess hemodynamic status
2. Heart rate, BP, color, skin turgor, skin temperature (all associations of shock)
3. Determine rate of blood loss
4. Complete PE
5. Uterine size
6. Fever
7. Pelvic
 - Bleeding from cervical os
 - Cervical dilatation
 - Cervical discharge
 - Cervical erosions
8. Assess Fetal Heart Tones

* All of the above would be necessary for this patient

Work-up:

- HCG to determine pregnancy vs. molar pregnancy vs. abnormal gestation (levels of hCG should double q2-3d in a normal viable intrauterine pregnancy for the first 7-8 wks after the LMP; with abnormal gestation, the levels rise more slowly, plateau or decline)
- CBC with diff
- Transvaginal US
- Cervical Cultures for GC, Chlamydia...
- Rh status
- Type and screen for PRBC
- PT/PTT

* All of the above would be necessary for the above patient.

Management:

1. Threatened abortion
 - a. Stabilize IV D5LR or bld
 - b. Bedrest with sexual abstinence: no benefit from randomized trials that this is beneficial
 - c. Increase fluids
 - d. If Rh- Rhogam (<13 wks 50mcg IM, >13 wks 300 mcg IM)
2. Inevitable or missed AB dx via US (absence of FHR and declining serial hCG levels)
 - a. Stabilize IVNS or LR
 - b. Rh- Rhogam
 - c. Pt has option of expectant management (letting nature take its course), medical management with Misoprostol, or surgical management with a suction dilation and curettage
 - e. D&C
 - Upon D&C the pt can take methylergonovine for 1-2 days to control any bleeding and doxycycline, 100mg bid q7d.
 - The patient should abstain from sex, tampons, and other vaginal contaminants for 2 weeks and use birth control for 2-3 months before attempting pregnancy again
3. Incomplete abortion
 - a. IVF LR or NS with 30U oxytocin per liter at 150ml/h
 - b. Remove product of conception in cervical canal if possible
 - c. Suction D&C when pt stable and use post-op suggestions from above
 - d. FeSO₄ 325mg
4. Complete Abortion
 - a. Follow patient expectantly with serial hCG until 0
 - b. Rh- Rhogam
 - c. If following D&C follow above precautions
5. Ectopic pregnancy

- laparoscopic surgery to remove versus exploratory laparotomy if pt is unstable or methotrexate
- 6. Cervicitis or vaginitis
 - treat the infection with Flagyl, doxycycline, Erythromycin...
- 7. Molar pregnancy
 - D&E as soon as dx is made with oxytocin begun as soon as products are retrieved to decrease bleeding
 - Chemo with methotrexate or actinomycin D is sometimes needed if molar pregnancy persists or recurs: only about 20% require chemo and the cure rate is almost 100% when adequate F/U is given
 - F/U with serial hCGs and prevention of pregnancy with birth control

14. Glucose Intolerance in Pregnancy: 22 year old Carol, G1 PO, at 23 wks gestation by dates is referred to you with the following 3 hour 100g OGTT results: F 102; 1 hr 195; 2 hr 180; 3hr 140.

Epidemiology:

1. Diabetes should be strongly suspected in women who have:
 - a) A strong family history of diabetes
 - b) Previously given birth to large (i.e. macrosomic) infants
 - c) Persistent glucosuria
 - d) A history of unexplained miscarriages
2. Risks
 - a) Age > 25
 - b) obesity
 - c) family hx DM
 - d) previous macrosomic infant
 - e) previous still birth
 - f) previous deformed infant
 - g) previous polyhydramnios
 - h) h/o recurrent abortions

Screening:

1. Glucosuria during pregnancy - should be investigated, even though the presence of glucosuria does **not** always reflect hyperglycemia from impaired glucose tolerance, but may reflect a lower renal threshold for glucose, which may be induced by a normal pregnancy.
2. Glucose Testing - should be done at 24-28 weeks when insulin requirements of pregnancy are maximal. High risk patients should be screened at 1st visit if the visit is prior to 24 weeks.
 - a. Screening tests - *screening* tests for high-risk patients are performed before and after a 50g/100g glucose load. There are three acceptable screening tests. An abnormal test necessitates a standard glucose tolerance test. Abnormalities are reflected by the following plasma glucose levels:
 - a) Fasting (FBG)- 105mg/dl or above
 - b) One hour- 135 mg/dl or above (50g load)
 - c) Two hour - 140 mg/dl or above (100g load)
 - b. Standard glucose tolerance test is a 3 hour test with periodic blood determinations after a 100g glucose load is ingested. This test is done if any of the three above screening test results are abnormal or borderline. *Class A diabetes (chemical diabetes)* is diagnosed when **two or more** plasma glucose levels equal or exceed:
 - a) 105 mg/dl (fasting)
 - b) 190 mg/dl (1 hour)
 - c) 165 mg/dl (2 hour)
 - d) 145 mg/dl (3 hour)

Classification: (White's)

- A1: Glucose intolerance in pregnancy (GDM) with normal FBG (<105) - Rx with diet only
 A2: GDM w/ FBG >105 or 2^{hour} pp(postprandial) glucose >120
 GB: Failed A2 diabetic with FBG > 105 despite ADA diet and low dose insulin
 B: Maturity Onset Diabetes; age at onset >20yrs and duration <10yrs
 C: Age at onset 10-19 yrs or 10-19 yr duration
 D: Age at onset <10yrs or >20 yr duration w/ benign retinopathy, calcified vv of legs or HTN
 F: nephropathy (> 300 mg protein/24 hr urine)
 R: proliferating retinopathy
 H: Maturity Onset Diabetes w/ heart dz

Complications:

1. Effect of pregnancy on diabetes
 - a. The diabetogenic properties of pregnancy are reversible but still may induce abnormalities in glucose tolerance in women who have no evidence of diabetes.
 - (i) Insulin antagonism is due to the action of human *placental lactogen* and the steroids estrogen and progesterone.
 - (ii) *Placental insulinase* accelerates insulin degradation.
 - b. control of diabetes may be more difficult in pregnancy.
 - (i) Insulin shock can result from nausea and vomiting (due to the patient's lack of sustenance).
 - (ii) Insulin resistance and ketoacidosis can result from infection.
 - c. Insulin requirements in chemical and overt diabetics decrease rapidly after delivery because of the disappearance of *placental lactogen and insulinase*, as well as the reduction in estrogen and progesterone.
2. Effect of diabetes on pregnancy
 - a. Mother - There is an increased likelihood of:
 - (i) Preeclampsia and eclampsia
 - (ii) Infection, which can be severe
 - (iii) Macrosomic infant, which can present problems with delivery, such as shoulder dystocia
 - (iv) C/S delivery due to macrosomia
 - (v) Polyhydramnios
 - (vi) Postpartum hemorrhage
 - (vii) IUGR (with more advanced stages of DM and vascular involvement)
 - b. Fetus - there is an increased likelihood of :
 - (i) Perinatal mortality, especially when the pregnant diabetic is not managed appropriately
 - (ii) Perinatal morbidity from birth injury (often due to macrosomia with accompanying shoulder dystocia and brachial plexus injury) and preterm delivery
 - (iii) Perinatal hypoglycemia and hypocalcemia
 - (iv) Congenital abnormalities, such as neural tube and heart defects
 - (v) Diabetes in the infant's offspring

Management:

1. Preconception and prenatal care: A patient with GDM needs Rx to lower perinatal & maternal risks. The mainstay of therapy is dietary modification to lower fat. (30-35 kcal/kg/d =1800-2800cal ADA diet) Along with regular daily exercise.
 - a. Hemoglobin A1c determination at the patient's first visit provides an assessment of her prior diabetic regulation.
 - b. Strict glucose control prior to and during early pregnancy is thought to reduce the risk of severe malformations, such as neural tube defects, which are seen in fetuses of poorly controlled diabetics. The maternal glucose level should be kept as close to normal as possible.
 - (i) This may involve one or more antepartum hospitalizations for glucose control.
 - (ii) The pregnancy should continue until the fetus is mature unless the intrauterine environment has deteriorated to the point at which fetal well being is threatened.
 - c. Determination of the precise fetal age is important in a diabetic woman.

- (e) The goal is an L/S ratio of 2.5 or greater, an event that usually occurs at about 35-36 weeks gestation in most *normal* pregnancies.
- (f) Lung maturity at 37-38 weeks in an insulin-dependent diabetic cannot be assumed without measuring amniotic fluid levels of lecithin, sphingomyelin and phosphatidylglycerol.
- (g) In general, well controlled patients without vascular disease may be delivered at 39 weeks. Amnio should be considered prior to 39 weeks in patients with Class D diabetes or greater, polyhydramnios, macrosomia, poor glycemic control, chronic hypertension on medications, IUGR
- (iii) Method of Delivery
 - (a) Induction of labor may be attempted if the fetus is not excessively large and if the cervix is capable of being induced (i.e. if the cervix is soft, appreciable effaced, and somewhat dilated)
 - (b) C/S is commonly used to avoid the trauma of a delivery of a large infant and to avoid the stress of labor for the fetus that has shown signs of distress. GDM is **not** an indication for C/S but its complications may be such as EFW greater than 4500 grams.

16. Hypertension in pregnancy: 16 year old Tiffany, G1 P0 at 35 weeks gestation comes to your office for a regular prenatal visit. BP is 150/90.

Definition:

- A. An absolute BP > 140/90 is abnormal because the resting arterial pressure is lower in pregnancy. An increase of 30mmHg systolic or 15 mmHg diastolic also represents pathology. The diagnosis of hypertension is reserved for those with an abnormal reading, taken with the patient at rest on two occasions at least 6 hours apart.
- B. There are 4 classifications of hypertensive disorders of pregnancy:
 1. Pre-eclampsia (hypertension peculiar to pregnancy)
 2. Chronic hypertension
 3. Chronic hypertension with superimposed pre-E
 4. Gestational hypertension: hypertension without proteinuria or other signs of PreE

Risk Factors:

- Nulliparity
- Preeclampsia in a previous pregnancy
- Age greater than 35 or teenager
- Ethnicity (African American or Hispanic)
- Family history of PIH
- Chronic hypertension
- Chronic renal disease
- Antiphospholipid antibody
- Vascular connective tissue disease
- Diabetes Mellitus
- Multifetal gestation

Pathophysiology:

- A. Pre-eclampsia
 1. Epidemiology:
 - primarily confined to a young woman in her first pregnancy, commonly occurring during the last trimester of pregnancy (if it arises in the early second trimester (14-20 weeks) a hydatidiform mole or choriocarcinoma should be considered).
 - *Eclampsia is the addition of grand mal seizures to either the mild or the severe pre-E syndrome. 25% develop eclampsia before labor, 50% during labor and 25% after delivery.*
 2. Etiology:

- unknown, but the pathophysiologic abnormality is a generalized arteriolar constriction or vasospasm. The rise in BP can be from CO or TPR (remember $BP=CO \times TPR$ with $CO=SV \times HR$).
 - In general, the CO in a pre-E does not differ significantly from normal pregnant subjects, but the systemic vascular resistance is significantly elevated in the pre-E.
 - The Renal blood flow and GFR in pts with pre-E is significantly lower than in normal pregnant subjects.
 - The cerebral vascular resistance is always high in pts with pre-E and eclampsia
3. Hypotheses:
 - i. pre-E secondary to an immunologic factor or deficiency. An excessive compatibility or excessive incompatibility between mother and fetus has been suggested.
 - ii. Pre-E secondary to an imbalance between the vasodilators PGE2 and prostacyclin and the vasoconstrictor PGF series and thromboxanes
 - Normal pregnancy- Prostacyclin (PGI2) synthesis increases 4-5x while thromboxane A2 production remains unchanged. PGI2 decreases vascular resistance and decreases platelet aggregation. Without the increase in PGI2 the pre-E will have increased vascular resistance and increased platelet aggregation.
 - iii. Pre-E secondary to uteroplacental ischemia, which leads to production of a vasoconstrictor substance which, produces renal vasoconstriction and increased production of renin-angiotensin and aldosterone.
 - The increase in the RAAS produces a generalized vasoconstriction and aggravates further uteroplacental ischemia.
 - Aldo increases water and electrolyte retention and generalized edema.
 - With further vasoconstriction in the kidney arteriolar and capillary bed there is hypoxia and increased permeability of the glomerular membrane leading to proteinuria and further edema.
 - Opposing the hypothesis are the findings of no vasoconstrictor substance isolated from the blood of pts with pre-E and blood levels of renin-angiotensin and aldo are not significantly different from normal pregnant subjects.
 4. pathologic lesions associated with pre-E and eclampsia:
 - i. Hemorrhage and necrosis in many organs associated with arteriolar vasoconstriction. If vasospasm >3hours vital organs such as the liver, placenta, and brain may infarct. Retinal hemorrhage is ominous sign.
 - ii. Glomerular capillary endotheliosis
 - iii. Lack of decidualization of the myometrial segments of the spiral arteries
- B. Chronic Hypertension: Hypertension known to antedate the pregnancy or in whom hypertension is first noted before the twentieth gestational week. It is not uncommon for the physiologic stress of pregnancy to bring to clinical attention previously unapparent or subclinical vascular or renal disease.
 - C. Chronic Hypertension with superimposed pre-eclampsia: In most instances there is an underlying hypertensive disorder of renal or other origin and the process is aggravated by pregnancy. The diagnosis should be reserved for those with chronic hypertension who have a marked increase in pre-existing proteinuria during pregnancy or have proteinuria for the first time in the latter half of pregnancy.
 - D. Gestational hypertension: This occurs in the second half of pregnancy, during labor, or within 48 hours of delivery without significant proteinuria. The diagnosis should be made only in retrospect, when the pregnancy has been completed without the development of proteinuria.
 - E. HELLP: hemolysis, elevated liver enzymes, low platelet count: This condition is associated with significant maternal and fetal morbidity.

Differential Diagnosis:

- i. Pre-E and eclampsia
- ii. Chronic hypertension
 - a. Essential hypertension
 - b. Acute and chronic glomerulonephritis

- c. Chronic pyelonephritis
- d. Collagen vascular disease (particularly SLE)
- iii. Chronic hypertension with superimposed pre-E
- iv. Gestational hypertension

History:

- A. Pre-E:
 - 1. Age (typically a disease of young women < 25 years of age)
 - 2. What trimester (typically a disease of third trimester)
 - 3. Any previous history of any elevated BPs?
 - i. Previous pregnancies and their course
 - ii. The course of this pregnancy and BPs during each trimester
 - iii. History of any headaches
 - iv. History of any visual changes
 - Blurred vision, spots and scotomata (retinal vasospasm)
 - v. Recent weight gain (edema)
 - 4. Abdominal pain particularly RUQ (if liver infarcts periportal necrosis, and hemorrhage may occur with a subcapsular hematoma)
 - 5. Urine output (assess renal function)
 - 6. Shortness of breath (assess pulmonary edema)
 - 7. Bleeding disorders (assess thrombocytopenia)
 - i. Meds
 - ii. Family history
 - iii. Social history including cigarette, alcohol, and drug use
- B. Chronic Hypertension
 - 1. Previous hypertensive or other medical disorders causing hypertension
 - 2. Age of onset of hypertension
 - 3. BPs before pregnancy and medications used
 - 4. History of pyelo
 - 5. History of autoimmune disease
 - 6. Headaches, changes in vision
 - 7. Meds
 - 8. Family history
 - 9. Social history
- C. Chronic Hypertension with superimposed pre-E
 - See above histories
- D. Gestational Hypertension
 - 1. Onset of increased BPs
 - 2. Any previous hypertensive or other medical disorders assoc with hypertension
 - 3. General elements of the histories above

Physical Exam:

- A. Vital signs with attention to the BP with serial sitting BPs. Note temp, HR and RR to r/o infection. The DBP should be noted since it more accurately assesses peripheral resistance.
 - B. All should receive a complete PE with concentration on the following to r/o pre-E:
 - 1. Eyes (fundoscopic exam to note any hypertensive changes and record a baseline)
 - 2. BP taken in both arms to r/o aortic coarctation
 - 3. CV and lungs to assess pulmonary edema
 - 4. Abdominal exam to assess RUQ pain
 - C. Extremity exam to assess edema (particularly of face and hands) and cyanosis
 - D. Neuro exam to assess headache, altered consciousness, hyperreflexia and irritability of reflexes (worrisome of CNS involvement)
- * Our patient is worrisome because of her age (16) her nulliparity and because she is in her third trimester. Her BP of 150/90 is alarming on first glance, but we must take a complete history and also assess BPs on separate occasions.
- Has she been having headaches?
 - Has she had any recent weight gain?

- Any problems with her vision?
- Any recent abdominal pain in her RUQ?
- Any recent fevers or infections?
- Any history of any previous elevated BPs before pregnancy?
- She needs a complete history and physical concentrating on all the areas above, not confined to pre-E.

Work-up:A. Pre-E

1. Triad of hypertension, edema (hands and face) and proteinuria must be present. May also see:
 - i. Oliguria (<400ml/24hr)
 - ii. Altered consciousness, Headache, scotomata, or blurred vision
 - iii. Pulmonary edema or cyanosis
 - iv. Epigastric or RUQ pain
 - v. Significantly altered liver function
 - vi. Significant thrombocytopenia
2. Blood: CR, Platelet count, Liver function studies, PCV
3. Urine: Spot urine protein/CR ratio and/or +/- 24-hr protein, and 24-hr creatinine
4. Ultrasound: to evaluate growth (r/o IUGR) and fluid (r/o oligohydramnios)

B. Chronic Hypertension

1. Hypertension before pregnancy or prior to 20 weeks gestation
2. Blood: electrolytes, Creatinine, \pm ANA
3. Urine: Spot urine protein/CR ratio or 24-hr protein, and 24-hr creatinine
4. EKG, ultrasound

C. Chronic with superimposed pre-E (follows above)D. Gestational hypertension

- Similar to above with no proteinuria evident

Management:A. Pre-E:

1. Bedrest in left lateral position (for the 48hrs following of diagnosis activity out of bed should be limited to eating meals and using the bathroom)
 - Follow BPs closely
2. Management varies depending on gestational age, fetal status (fetal testing results, amniotic fluid volume, fetal growth), degree of blood pressure elevation and cervical examination
 - i. All patients with preeclampsia are hospitalized until they deliver
 - ii. All patients who develop evidence of severe disease (e.g. BP \geq 160/110, lab abnormalities, symptoms, oligo/IUGR, pulmonary edema) are delivered
 - iii. Consider delivery in patients with mild disease if they are > 36 weeks (MD may decide to do amnio to document fetal lung maturity)
 - iv. Patients with BP \geq 160/110 need antihypertensive therapy to acutely control BP (see table attached for choices Hacker and Moore table 15-5)
 - v. Intrapartum fetal monitoring is mandatory
 - vi. Anticonvulsant (magnesium sulfate) is used for seizure prophylaxis in all pre-E during L&D and for 24hrs after delivery
 - vii. The ultimate management is delivery as the condition is cured with delivery of the baby and the placenta.
 - viii. Administer betamethasone if less than 34 weeks gestational age

B. Chronic Hypertension

1. Continue all previous meds
2. Reduced physical activity
3. Bed rest
4. Serial ultrasonic examinations to detect IUGR
5. Fetal testing (NST/CST) at 34 weeks to ensure fetal well being

6. Watch closely for evidence of superimposed preeclampsia

Long-Term Sequelae:

- No long-term maternal sequelae to an episode of uncomplicated pre-E or eclampsia. The patient is at no increased risk of developing CV disease. Their female offspring do have an increased risk of developing pre-E

17. Isoimmunization: 31 year-old Charlotte, G2 P1, was seen at your office for the first prenatal visit at 12 weeks gestation by dates. Her prenatal laboratory panel reveals a blood type of AB negative. (a) Her atypical antibody screen is positive. (b) Her atypical antibody screen is negative.

Definition: "Isoimmunization refers to the development of antibodies to RBC antigens following exposure to such antigens from another individual." For our purposes the other individual is the growing baby, 50% of whose genetic make-up is different from the mother's.

Pathophysiology:

1. If mom is exposed to baby's RBCs anytime during pregnancy (which is highly likely as only a tiny amount of blood is sufficient) she may develop antibodies to the baby's red blood cell antigens.
 - Later in that pregnancy or even more likely, in a subsequent pregnancy, mom's antibodies can cross the placenta and destroy fetal RBCs leading to fetal anemia, etc.
 - Though baby has a huge capacity to manufacture RBCs, this capacity has its limits.
2. RBCs have many surface antigens, however the most frequently involved group is called Rhesus (Rh) system.
 - Of the Rh system, the D antigen is most commonly associated with hemolytic disease.
 - 15% of Rh - moms with Rh+ babies develop antibodies.
 - During the first pregnancy the baby usually has no complications. In the next pregnancy passage of even tiny quantities of blood can evoke significant maternal antibody production.
 - In the case of the Rh antigen, IgG which easily crosses the placenta is produced. The antibody binds fetal RBCs-->hemolysis-->increase bilirubin-->anemia, jaundice, etc.
 - In the first baby this may be mild, but in later pregnancies, the transfer of IgG may be accelerated and lead to serious anemia outstripping liver capacity for RBC production and decrease the amount of other proteins produced.
 - Therefore you get anemia (which if severe, can lead to "high output" CHF), and decreased oncotic pressure causing fetal ascites and edema-->hydrops fetalis.

History and Workup:

1. Evaluation of Rh status is conducted on every mother by analysis of blood type.
2. Routine antenatal labs also check maternal blood for the presence of a variety of antibodies.
 - Significant ones are further evaluated for strength of antibody response.
 - Titers of 1:16 or greater are considered critical values and warrant further evaluation when considering the D antigen

Management: (of Rh- moms)--Positive Titers:

1. Mildly + (< 1:16) requires review of chart to see if pt ever given RhoGAM (e.g. with previous pregnancy), ask about prior history of transfusions. Follow titers regularly (e.g. monthly) and check antigen status of the father of the baby. If the father does not express the antigen to which the mother is producing antibodies the fetus will not be affected!
2. Strongly + indicates need for further eval of fetus including amniotic fluid assessment and ultrasound (as well as typical NST, CST, etc later in pregnancy.) Amniotic fluid is checked for level of bilirubin which accurately reflects the fetus's condition. Bili levels decrease during nl pregnancy on a determined rate and degrees of deviation is referred to as change in optical density-- OD450. Markedly elevated OD450 values indicate severely affected fetuses. US can detect signs of severe hemolysis like ascites, etc. If baby found in severe cond., an infusion of Rh- RBCs can be infused into the cord. Values of OD 450 are plotted on Liley Curve

3. Negative Titers: -on initial screen needs to be rechecked at 28wks, if still negative, RhoGAM is given prophylactically. If the baby is born Rh-, so no more, but if the baby is Rh+, another 300microgm of Rh immunoglobulin(RhoGAM) is given within 72hrs of delivery. Subsequent risk of complications is decreased from 15% to 2% when only PP rhogam is given. Decreases to .6% when Rhogam is also given at 28 weeks
4. Other indications for RhoGAM administration include: at time of amniocentesis, after + Kleihauer-Betke test, after an ectopic pregnancy, after spontaneous or induced abortion after abdominal trauma, after vaginal delivery or cesarean section.

20. Multiple Gestation: 21 year old Maggie G1 P0, at 15 weeks gestation has a uterine fundus palpable at the umbilicus. An ultrasound examination shows twin gestation with a single placenta but no septum was visualized.

Etiology and Epidemiology:

- A. The overall incidence of twins at delivery is approximately 1%.
 1. There are 2 types of twins, depending on how many ova are released: monozygotic and dizygotic types.
 2. Monozygotic twinning is a chance occurrence and is little affected by other parameters. It occurs approximately 3-4 of 1000 births throughout the world.
 - Rates increase slightly with delayed implantation, as occurs with in vitro fertilization.
 3. The frequency of dizygotic twinning does vary throughout the world and has several factors affecting its incidence
 - Rates: 7-10 per 1000 among Caucasians, 10-40 per 1000 among Africans, and 3 per 1000 among Asians.
 - Heredity and the use of certain drugs in the preovulatory phase of the cycle increases the frequency of dizygotic twinning.
- B. Placentation:
 1. In dizygotic twinning, two individual placental units are produced, and the membrane between these two has amnion and chorion layers from each infant.
 - The central membrane (septum) between the infants has two amnion layers and two chorion layers, a situation always seen with dizygotic twins.
 2. In monozygotic twins, the placentation depends on the time at which the twin division occurs, because the amnion and chorion form at different times in gestation.
 - If the division of the zygote occurs in less than 3 days, 2 independent placental units are formed, and the central membrane contains two amnion and two chorion layers, which is the same for dizygotic twins.
 - The chorion forms by day 3, and if the division occurs between days 3 and 8, the placenta has two amnion membranes and only one chorion, and the central membrane between the infants is thin; this is called a monochorionic placenta.
 - The amnion forms by day 8, and if the division occurs between day 8 and day 13 of gestation, no central membrane develops, and a monoamniotic monochorionic (or referred to just as monoamniotic) twin placenta occurs.
 - If the division occurs after day 13, the result is a physical attachment of the twin bodies producing conjoined twins.

Risks:

- A. Since no septum was visualized on ultrasound, Maggie is most likely to have monoamniotic monochorionic placenta.
 - Monoamniotic twinning is uncommon, occurring in approximately 1% of monozygotic twins or 0.3% of all twin gestations.
 - A risk in these pregnancies is cord entanglement with fetal movement, which can lead to obstruction of blood flow and fetal death.
 - Perinatal mortality caused by this complication approaches 50%; most of the fetuses that die are less than 32 weeks of gestation.
- B. The diagnosis can be suspected by being unable to find a septum on the ultrasound scan.

Physical Exam:

- The clinical exam usually reveals an uterine fundal height growing at a rate that is greater than expected for a singleton pregnancy.
- With a singleton pregnancy, after 20 weeks of gestation the fundus should be palpable at or near the umbilicus.
- Since Maggie is carrying twins, a palpable uterine fundus at 15 weeks is not unusual.

Management:

- If monoamniotic twins are diagnosed, fetal heart rate testing should be done starting at 28 weeks gestation, with special attention to identifying cord compression patterns.
- Delivery is affected as soon as fetal lung maturity is diagnosed
- Cesarean delivery is performed for monoamniotic twins.

32. Prenatal Diagnosis: 42 yo Naomi G1 P1 comes in for her first prenatal visit at 8 weeks by dates. She had a previous Down's baby with spina bifida. She asks if you can help identify if her present fetus is normal.

History:

- Age of mother
- Child or family history of birth defects, genetic disorders, etc.
- Previous OB history, including #fetal losses, #preterm births, etc.
- Past or present exposure to teratogenic agents such as thalidomide, alcohol, antibiotics, etc.

Indications for prenatal diagnosis:

1. Age greater than 34
2. Previous child or family history of birth defects, mental retardation, chromosomal abnormality, or known genetic disorder.
3. Multiple fetal losses.
4. A baby who died in the neonatal period.
5. Maternal conditions predisposing the fetus to congenital abnormalities.
6. A current pregnancy history of teratogenic exposure.

Risk:

1. 1/1000 incidence of neural tube defects (3% for couples with previous child with n.t. defect)
2. 1/800 incidence of Down Syndrome in general population (1/300 for women 35-39, 1/80 for women 40-45)
*risk increases 1% if previous Down's baby

Tests:

1. Maternal Serum Alpha-Fetoprotein (MSAFP)
~optimal at 16-18 wks: can be done between 14 –21 weeks
~detects 80% of neural tube defects (NTD) - may also detect ventral wall defects such as gastroschisis or omphalocele
~**increased** in NTDs, ventral wall defects (also multiple gestation, fetal demise or inaccurate gest age)
**do ultrasound to r/o false positives, then amniocentesis to measure amniotic fluid AFP and AChE (present only if open NTD)
~**decreased** in assoc with Down Syndrome (detects about 20%)
**Quad Screen - more sensitive if present with *decreased unconjugated estradiol* and *increased HCG and increased inhibin* (this method will detect 60%)
**do ultrasound to r/o false positives (dating discrepancy or fetal demise), then amniocentesis to determine fetal karyotype
2. Amniocentesis
~performed at 16-20 wks
~detects chromosomal disorders and NTDs (~99% accuracy for chrom. disorders)
~about 20 ml of amniotic fluid is aspirated - takes about 10-14 days for chrom. analysis
~"early" amniocentesis (less than 15 wks) may be done if CVS cannot be done

3. Chorionic Villous Sampling (CVS)
 - ~performed at 9-12 wks (transabdominal or transcervical)
 - ~direct study of the dividing cells can detect chrom. abnorm. within 48 hr
 - ~can also detect biochemical genetic disorders such as Tay-Sachs, Gaucher, etc
 - ~risk of miscarriage about 1% higher than normal 1st trimester risk
 - ~CANNOT measure AFP by this method
4. Percutaneous Umbilical Blood Sampling (PUBS)
 - ~performed in second or third trimester
 - ~used to confirm chrom. abnormalities suggested by US, amnio, or CVS
 - ~rapid fetal karyotype (48 hrs)
 - ~procedure relate loss rate higher (1%) than with amnio (1/200)
6. Ultrasonography (US)
 - ~used to identify structural abnormalities (craniospinal, GI, renal, skeletal, heart)
 - ~transvaginal US used in 1st trimester to assess fetal viability
 - ~echocardiograms can delineate congenital heart defects in high risk women
7. Recombinant DNA Technology

45. Third Trimester Bleeding: 32 year-old Elsie, G4 P3, at 31 weeks gestation comes to L&D with complaints of painless vaginal bleeding for the past hour. On exam her perineum is grossly bloody but there is no active bleeding.

Differential Diagnosis:

1. Contact Bleeding - cervical or vaginal lesions/lacerations (ie. caused by intercourse)
2. Cervical Inflammation - ie. Infection (cervicitis/vaginitis)
3. Cervical Effacement and Dilatation (labor)
4. Placenta Previa
5. Abruptio placentae
6. Uterine rupture
7. Coagulation disorder
8. Fetal Vessel Rupture
9. Cervical Cancer

Etiology and Pathophysiology:

1. Placenta Previa:
 - a. Comprises 20% of all antepartum hemorrhages.
 - b. defined by a placenta which precedes the baby to the cervical os
 - i. complete (covering the entire os)
 - ii. partial (covers part of the os)
 - iii. marginal (only touches the edge of the os)
 - iv. Don't confuse this with a low-lying placenta, where the placenta implants on the lower third of the uterus. Low-lying placentas generally don't cause bleeding.
 - c. Predisposing Risk Factors for PP:
 - i. Multiparity
 - ii. Increasing maternal age
 - iii. Prior PP (4-8% risk of recurrence)
 - v. Multiple gestation
 - vi. Prior cesarean delivery
 - vii. Prior number of curettage for spontaneous or induced Abs
 - viii. Maternal smoking
 - d. Diagnosis is made by ultrasound.
 - e. Placenta previa may also be associated with abruptio or labor, so contractions don't rule out PP.
 - i. This is also associated with placenta accreta (condition of abnormal placental adherence).

- ii. Maternal mortality is less than 1% and the risk to the fetus is associated with preterm delivery.
 - f. Management of PP:
 - i. If bleeding is not excessive, manage with bedrest/pelvic rest.
 - ii. Follow maternal Hct and ensure blood available iron supplementation.
 - iii. Assess fetal lung maturity (L/S ratio) at 36 wks and delivery by cesarean section.
2. Abruptio Placentae:
- a. Occurs in 1/120 births
 - b. Defined by premature separation of placenta from the uterine wall.
 - i. This separation can be initiated by a hemorrhage into the decidua basalis and cause formation of a decidual hematoma.
 - ii. Placental abruption is the most common cause of DIC in pregnancy, secondary to release of thromboplastin from the disrupted placenta into maternal circulation.
 - iii. DIC occurs in 20% of cases.
 - Hypovolemic shock and acute renal failure may be seen with abruption in these cases.
 - Perinatal mortality rate is 35%.
 - c. Predisposing factors to AP:
 - i. Hypertension
 - ii. Trauma
 - iii. Polyhydramnios with rapid decompression on membrane rupture
 - iv. Cocaine or tobacco use
 - v. Preterm PROM
 - vi. Short umbilical cord
 - vii. Increased parity
 - viii. Prior history of abruption
 - d. Diagnosis of AP: Made largely on presentation including:
 - i. Uterine tenderness
 - ii. Uterine hyperactivity
 - iii. Increased tone
 - iv. Vaginal bleeding
 - ix. Maternal tachycardia or hypotension
 - x. Nonreassuring fetal heart rate tracing (e.g., tachycardia, late decels)
 - e. Management: Deliver as soon as possible and monitor Mom and fetus as with a previa. Transfuse if HCT is less than 30% or if UOP is less than 30cc/hour
3. Uterine Rupture:
- a. Is defined by complete separation of the uterine musculature through all of its layers, with all or a part of the fetus sticking out of the uterine cavity.
 - b. Overall incidence is 0.5 %.
 - i. A prior uterine scar is associated with 40% of cases.
 - ii. Risk with a vertical (classic) c-section is 10 times that of a low transverse.
 - c. Factors assoc. with rupture in an unscarred uterus are:
 - i. injudicious use of oxytocin
 - ii. grand multiparity
 - iii. marked uterine distension
 - iv. abnormal fetal lie
 - v. cephalopelvic disproportion
 - vi. external version/extraction
 - vii. shoulder dystocia
 - viii. midforceps delivery
 - ix. uteroplacental pathology
 - x. trauma
 - d. Diagnosis:
 - i. Rupture is classically associated with acute onset of severe abdominal pain and a nonreassuring fetal tracing.

- ii. Impending rupture may be preceded by hyperventilation, restlessness, agitation and tachycardia. Vaginal bleeding may be present or absent. Loss of fetal station may be seen.
- e. Management:
 - i. If there is a high degree of suspicion, immediate laparotomy is required.
 - ii. Usually total abdominal hysterectomy is the treatment of choice, but repair of the rupture site can be considered if the site is small and the woman desires future fertility.

General Principles Of Managing A Third Trimester Bleed:

1. Assess hemodynamic stability of mother - pulse, BP, skin color, mentation. If these are not satisfactory, more drastic treatments are required.
2. Establish fetal heart tone monitoring.
3. Volume replete with fluids and transfusion if necessary.
4. If fetus is in distress or unstable, c-section immediately.
5. In the case of placental abruption, use oxytocin to assist in vaginal delivery. DIC should resolve once the patient is delivered.

48. UTI In Pregnancy: 21 year-old Rochelle, G2 P1, at 30 weeks gestation presents to your ER with 103.5 fever, right flank tenderness, and dysuria.

Background:

1. UTI is common in pregnancy.
 - 9-11% of ALL women will have an asymptomatic infection with >100,000 CFU's on a midstream culture.
 - Untreated, 25% will develop symptomatic UTI.
2. Asymptomatic bacteriuria is more likely to become symptomatic in the pregnant female.
 - This is likely due to pregnancy-induced urinary stasis (progesterone decreases ureteral tone and motility) and glycosuria (common in pregnancy).
 - Also, urinary pH is increased due to increased bicarb secretion which can cause increased bacterial growth.
3. Acute cystitis occurs in 1% of pregnancies.
4. Pyelonephritis occurs in 1-2% of all pregnant patients, and is one of the most common complications requiring hospitalization.
 - These patients will be acutely ill, with fever, costovertebral tenderness, general malaise, and often dehydration.
 - * This case description might suggest pyelo, but it's titled UTI, so I went with that.

History/Exam:

1. It is standard to obtain a urine culture at the onset of prenatal care and treat asymptomatic bacteriuria, typically with ampicillin, sulfisoxazole, or nitrofurantoin, as the bug is usually *E. coli*.
2. Suppressive therapy with nitrofurantoin (100 mg q.d.) is indicated with repetitive UTI's in pregnancy, or following pyelonephritis in preg. Treat cystitis identically. Pyelo is described above. Blood cultures are a good idea if you suspect pyelo and the patient is ill appearing.

Treatment:

1. For UTI, ampicillin (500 mg qid), sulfisoxazole (1 g qid), or nitrofurantoin (100 mg qid) for 7-10 days is usually sufficient. Shorter (3d) courses may be acceptable as well.
 - In the 3rd trimester, sulfas shouldn't be used as they compete with bilirubin for albumin-binding sites, and may cause hyperbilirubinemia in the newborn.
 - Nitrofurantoin should be avoided in late pregnancy because of the risk of hemolysis as a result of deficiency of erythrocyte phosphate dehydrogenase in the newborn.
 - Suppression therapy with nitrofurantoin as above when indicated.
2. For pyelo, IV hydration and antibiotics, usually a first-generation cephalosporin or ampicillin/gentamicin.
 - Uterine contractions may be seen, and preterm labor could develop.
 - Also, *E. coli* may produce phospholipase A, which could promote prostaglandin synthesis, which could increase uterine activity.

- Fever is known to produce contractions so any temp over 100 °F should be treated with antipyretics.
- Sepsis occurs in 2-3% patients with pyelo, so careful management is key. Pulmonary edema/ARDS may be seen.
- If acute pyelo does not respond to antibiotics, you must suspect obstruction or a paranephric abscess, and consider imaging studies (U/S, IVP).

Analysis:

- Though the given case states *UTI in pregnancy*, a patient with this history in the ER may have indication for hospitalization.
- Certainly, antipyretics and antibiotics should be given promptly after cultures are obtained.
- However, I think the most reasonable approach would be admission for IV hydration and antibiotics.

Section VI: Obstetrics**1. Abnormal Labor: L & D notifies you that 32 year-old Georgia, G4 P3, at 41 1/2 weeks gestation in active labor has been 5 cm dilated for the past 3 hours.**

Definition: Abnormal labor, or dystocia ("difficult labor or childbirth"), results when anatomic or functional abnormalities of the fetus, the maternal bony pelvis, the uterus and cervix, and/or a combination of the above interferes with the normal course of labor and delivery.

Pathophysiology: In order to diagnose abnormal labor, the normal stages of labor must first be considered:

1. Labor = the process by which products of conception (fetus, placenta, cord, membranes) are expelled from the uterus. It is defined as the progressive effacement and dilation of the uterine cervix as a result of rhythmic contractions of the uterine musculature.
2. It is further divided into stages:
 - a. **First stage** = interval between the onset of labor and full (10 cm) dilation.
 - (i) *latent phase* = cervical effacement and dilation <4 cm.
 - (ii) *active phase* = rapid cervical dilation, beginning at 4 cm, ends at 10 cm
 - b. **Second stage** = delivery of the infant through a completely dilated cervix.
 - c. **Third stage** = begins after delivery of infant, ends with delivery of placenta.
 - d. **Fourth stage** = first hour after delivery of placenta.
3. Abnormal labor patterns:
 - a. Prolonged latent phase
 - (i) No progress from latent to active phase of labor
 - (ii) >20 h for nulligravidas
 - (iii) >14 h for multiparas
 - b. Protraction disorders: Prolonged active phase of labor such that
 - (i) Cervical dilation proceeds at
 - <1.2 cm/hr for nulligravidas
 - <1.5 cm/hr for multiparas
 - (ii) Descent of the presenting part proceeds at
 - <1 cm/hr for nulligravidas
 - <1.5 cm/hr for multiparas
 - c. Arrest disorders
 - (i) Secondary arrest of dilation: no cervical dilation for >2 hr in active phase
 - (ii) Arrest of descent: no descent of the presenting part >1 hr in 2nd stage

Causes and evaluation of abnormal labor:

1. Remember the three basic components of labor and delivery:
 - a. the power (uterine contractions and maternal effort)
 - b. the passenger (the fetus)
 - c. the passage (maternal bony pelvis).
2. Monitoring progression of labor
 - a. **Frequent vaginal exams** (dilation/effacement/station of presenting part/presence of caput or molding/position of presenting part)
 - b. **assessment of uterine contractions** using a tocodynamometer or IUPC (intrauterine pressure catheter)
 - c. in the past, **X-ray pelvimetry** (to evaluate the maternal pelvis)
3. Causes of abnormal labor--
 - a. **Prolonged latent phase:**
 - abnormal fetal position
 - unripe cervix when labor starts
 - excessive anesthesia
 - fetopelvic disproportion
 - dysfunctional or ineffective contractions or **FALSE LABOR** (keep in mind)
 - b. **Prolonged active phase:**

- fetal malposition
 - fetopelvic disproportion
 - excess sedation
 - inadequate contractions
 - rupture of membranes before active phase
- c. **Secondary arrest** (cervical dilation stops for >2 hrs in active phase):
- infant too large
 - fetal malposition
 - small or abnormally shaped pelvis
 - inadequate contractions

Risks of prolonged labor:

1. Maternal risks:
 - Cesarean section
 - infection
 - exhaustion,
 - lacerations
 - uterine atony with possible hemorrhage.
2. Fetal risks:
 - asphyxia
 - trauma from difficult deliveries
 - infection
 - meconium aspiration syndrome (airway obstruction and chemical pneumonitis)

Management of abnormal labor:

1. Induction and augmentation with oxytocin (Pitocin)
 - a. By using the Bishop score (a scale of cervical 'ripeness') the decision whether to induce or augment can be made.
 - b. Augmentation of labor can be done in a prolonged latent phase, active phase (after considering fetal malposition), or with secondary arrest of dilation.
2. Cervical ripening
 - a. intravaginal prostaglandin gel
 - b. laminaria (hygroscopic rods made from seaweed inserted into the internal os so they can expand)
 - c. EASI (Extraamniotic saline infusion) catheter
3. Amniotomy
 - artificial rupture of the membranes using an amniohook can help speed up a prolonged latent phase.
4. Forceps/vacuum delivery
 - these tools can aid in the descent of the fetal head if cervix is completely dilated
5. Cesarean section
 - a. the decision on when to do a c-section is controversial. An IUPC should be used to ensure the contractions are adequate prior to performing C/S

Breech presentation:

1. occurs in about 2-4% of singleton deliveries at term; more frequently preterm.
2. associated factors:
 - multiple pregnancy
 - polyhydramnios
 - hydrocephaly
 - anencephaly
 - uterine anomalies
 - uterine tumors.
3. Three types of breech presentation:
 - a. frank = feet up by the head, butt first.
 - b. complete = feet sitting 'Indian-style'
 - c. incomplete = one foot kicking down, like the baby's going to hop out on one foot.

4. Correction of a breech:
 - a. external cephalic version--twisting the baby around from the outside can be done if the fetus is normal with reassuring heart tones, adequate amniotic fluid, the presenting part is not in pelvis, there are no operative scars on the uterus, and the woman is NOT in labor.
 - b. Risks include abruption, cord accident, and uterine rupture. External version is more successful in parous women.
 - c. Criteria for vaginal delivery of a breech:
 - normal labor curve
 - fetal weight between 2000-4000 g in frank or complete breech (not footling breech)
 - reassuring fetal heart tracing
 - adequate maternal pelvis by clinical pelvimetry
 - normally flexed fetal head

12. Fetal Distress: L & D nurse calls you in a panic regarding 18 year-old Peggy, G1 P0, 39 weeks gestation in active labor. The fetal monitor which was initially normal now shows FHR baseline at 70/min. FECG is in place.

Definitions:

1. Fetal distress: also known as non-reassuring fetal heart tones (NRFT)
2. Baseline fetal heart activity: baseline characteristics of fetal heart rate in the between uterine contractions. Normally 120-160 beats/min.
3. Periodic fetal heart rate activity: characteristics of fetal heart rate that are associated with uterine contractions.
4. Fetal bradycardia: Baseline rate < 120 beats/min for at least 3 min (preferably 10 min, to distinguish it from prolonged deceleration)
 - Mild: 100-119 beats/min
 - Moderate: 80-99 beats/min
 - Severe: < 80 beats/min

Pathophysiology: Bradycardia is the initial response of the fetus to acute hypoxia. The extent of bradycardia depends on the degree of fetal hypoxia.

Differential Causes: The asphyxic stimulus may be caused by:

- 1) decrease in maternal oxygen tension
 - during apnea of seizure
- 2) decrease in uterine blood flow
 - a. excessive uterine contractions
 - b. maternal hypotension due to:
 - conduction analgesia
 - compression of vena cava by uterus
 - uterine rupture
- 3) decrease in umbilical blood flow
 - cord compression (against head of fetus)
 - cord knot
 - cord prolapse (through cervix or uterine rupture)
- 4) loss of placental area (i.e. abruptio placentae)
- 5) fetal hemorrhage (rare, i.e. tearing of vasa previa)

History: (Things to ask the nurse or find in the chart)

What is the mother's vital signs?

-rule out maternal hypotension or apnea

Does the mother appear to be in hypovolemic shock?

-rule out placental abruption or uterine rupture

Does the mother appear to be in an excessive amount of pain?

-pain may be associated with hyperstimulation of uterus, placental abruption, or uterine rupture.

Does the patient have medical conditions such as hypertension, diabetes mellitus, or collagen-vascular disorders that can cause placental dysfunction?
Has there been evidence of intrauterine growth restriction?

Physical Exam:

1. Check the fetal heart rate strip, and determine the patterns of acceleration/deceleration, as well as beat to beat variability, and frequency of uterine contractions.
2. Determine how long the bradycardia has been present.
3. What is the quality and frequency of the mother's contractions?
4. Is there excessive vaginal bleeding or meconium passage?
5. Palpate the abdomen (Tender in placental abruption)
6. Palpate the uterus (Placental abruption, hyperstimulation, or uterine rupture causes tenderness, irritability, or hypertonus)
7. How much is the patient's cervix dilated and how close is the patient to delivery? (This will determine if a rapid delivery will be vaginal or cesarean)

Management:

1. Place the patient in the lateral position.
2. Administer supplemental oxygen
3. Decrease uterine contractions:
 - a. discontinue oxytocin
 - b. administer a tocolytic agent, if excessive uterine activity is present
 - Terbutaline sulfate 0.25 mg SQ once
 - MgSO₄ 2g IV over 10 min
4. Correct maternal hypotension
 - a. increase IV infusion rate
 - b. give ephedrine sulfate 25-50 mg IM or IV.
6. If above steps do not resolve bradycardia, plans should be made to proceed with delivery.
7. Remember to perform amnioinfusion if the variables are recurrent moderate/severe variables

Prolonged End-Stage Bradycardia

1. This term refers to a prolonged deceleration, generally late in the second stage of labor, in the presence of otherwise normal FHR tracing (quite likely to be a vagal response to head compression as the head traverses the depths of the pelvis).
2. The current recommendation is that if the bradycardia is persistent and FHR variability decreases, the baby should be delivered as rapidly as possible.
 - However, if beat to beat variability is retained, efforts should be made to abolish the bradycardia or effect a spontaneous delivery.
 - It is unusual for prolonged bradycardia to result in absence of FHR variability and fetal decompensation in less than 10 minutes if the FHR is above 60 beats/min.

21. Operative Obstetrics: 28 year old Sybil, G1 P0, 41 weeks gestation has been in the second stage of labor for the past four hours. She is exhausted and has not been pushing effectively. The fetus is cephalic presentation. Fetal position is right occiput transverse. Station is +1. The fetal head has molding and also caput formation. You recommend a cesarean. Sybil asks is a trial of vacuum extractor or forceps might be safer.

Definition:

- Second Stage of labor: the interval between full cervical dilatation and delivery of the infant.
 - *Arrest of descent* is one problem associated with the second stage of labor. This disorder requires prompt re-evaluation of uterine contractility, maternal and fetal well-being, and cephalopelvic relationships.
 - Obvious problems such as hypotonic dysfunction, over distended bladder, strong perineal resistance, conduction anesthesia, or ineffectual bearing down should be treated appropriately with a high expectation of success.
 - In the absence of such factors, however, very careful judgment is required. Estimation of fetopelvic relationships, including station, caput formation, molding, palpation of the fetal head above the symphysis, and malrotation, is mandatory.
 - For patients in whom *low* forceps delivery is possible, this is the procedure of choice.
 - When a low forceps delivery is not possible, the choice among midforceps delivery, vacuum extraction, oxytocin infusion, or cesarean delivery is extremely difficult and controversial.

Classifications: Forceps deliveries are classified according to the station of the fetal head at the time of application--

1. Outlet forceps: application of forceps when the scalp is visible at the introitus without separating the labia, the fetal skull has reached the pelvic floor, the fetal head is at or near the perineum, and the angle between the AP line and the sagittal suture does not exceed 45 degrees.
 2. Low forceps: application when the leading point of the skull is at station +2 or more, subclassified as to whether the angle between the sagittal suture and AP exceeds 45 degrees.
 3. Mid-forceps: application of forceps when the head is engaged but the presenting part is above station +2.
 4. Vacuum Extraction:
 - The classic instrument consists of a disk-shaped cup through which a vacuum of up to 0.8 kg/cc² is applied to the fetal scalp.
 - This suction induces a caput succedaneum (chignon) within the cup to which traditional force is applied during uterine contractions.
 - Randomized studies comparing forceps with vacuum have not shown a significant difference in success rates or complications and the choice of instrument appears to remain one of operator preference.
- * Since Sybil's baby is station +1 (above station +2) a mid-forceps delivery would be indicated if a forceps delivery was chosen.

Indications and Contraindications for Forceps/Vacuum Delivery:

1. The major controversy surrounds the mid-forceps delivery.
2. ACOG has suggested that that outlet forceps may be used to shorten the second stage of labor when it is in the best interest of the mother or fetus.
3. More difficult forceps delivery (low or mid forceps) may be considered when the second stage is prolonged, for fetal distress, or for maternal indications such as cardiac disease or exhaustion.
4. In a recent survey of residency programs in the U.S. and Canada, outlet and low forceps were used at all institutions, but 14% of the programs had abandoned the use of midforceps delivery.
5. Occiput Transverse Positions:
 - Forceps delivery from the occiput transverse position is best accomplished with the use of specialized forceps. The instruments (Kielland, Barton) require considerable skill and experience, and their use has decreased greatly in recent years.

6. The indications and contraindications to vacuum extraction are essentially the same as those for forceps delivery.
 - An advantage of vacuum extraction, however, is that delivery may be accomplished with minimal maternal analgesia.
 - The vacuum should not be maintained for longer than 30 min

Prerequisites for Forceps Delivery:

1. The membranes must be ruptured.
2. The cervix must be fully dilated.
3. The operator must be fully acquainted with the use of the instrument.
4. The position and station of the fetal head must be known with certainty.
5. Adequate maternal anesthesia for proper application of the forceps must be present.
6. The maternal pelvis must be adequate in size for atraumatic delivery.
7. The characteristics of the maternal pelvis must be appropriate for the type of delivery being considered.
8. The fetal head must be engaged.

Management:

- Cesarean delivery is employed when labor is contraindicated or vaginal delivery is unlikely to be accomplished safely or within a time frame necessary to prevent the development of fetal and/or maternal morbidity in excess of that expected following vaginal delivery.
- In Sybil's case, most physicians would recommend a cesarean section, as hers would be a very difficult mid-pelvic delivery.

24. Post Dates: 24 year-old Liza, G3 P1 Ab2, saw you for the first time 6 weeks ago. By dates, she is now 42 1/2 weeks gestation

Definition: Prolonged or post term pregnancy is one that persists > 42 weeks (294 days) from the onset of the last menstrual period.

Incidence: 6-12%; occurs more frequently women who are younger or older than average childbearing age and in grandmultiples (women who have had 5 or more pregnancies resulting in viable fetuses)

Etiology: unknown

- a. potential causes include deficiency of ACTH in the fetus
- b. Placental sulfatase deficiency
- c. ectopic (eg. abdominal) pregnancy
- d. Prolonged gestation is common in association with anencephaly due to fetal labor - initiating factor that is normally secreted from fetal adrenals (anencephalics have hypoplastic adrenals)

Effects On Fetus: Perinatal mortality is 2-3X higher in prolonged gestations. Increased risk to fetus and neonate can be attributed to the development of :

- 1) Fetal Postmaturity Syndrome (PMS)
 - a. occurs in **20-30%** of post term pregnancies
 - b. related to aging and infarction of the placenta, which results in placental insufficiency w/ impaired oxygen diffusion & decreased transfer of nutrients to the fetus
 - c. prenatal mortality factor increased w/ intrauterine hypoxia (meconium staining of umbilical cord, fetal membranes, skin, nails)
 - d. fetus typically has loss of subcutaneous fat, long fingernails, dry cracked wrinkled skin, abundant hair and unusual degree of alertness
- 2) Macrosomia (>4000 gm birth weight)—may occur in the remaining **70-80%** postdate fetuses without placental insufficiency .Macrosomia can result in :
 - a. Abnormal labor
 - b. Shoulder dystocia
 - c. Birth trauma
 - d. Increased C/S rate

Diagnosis: key to Dx is accurate dating of gestation (uncertain dates in 20-30% of all pregnancies).

Factors to distinguish postdated pregnancy from misdated pregnancy:

- a. accuracy of the date of the last normal menstrual period
- b. evaluation of uterine size on the pelvic examination in the first trimester
- c. evaluation of the uterine size in relation to gestational age during subsequent antenatal visits (concordance or size / dates discrepancy)
- d. gestational age when fetal heart tones were first heard with stethoscope (generally 18-20 weeks); gestational age when heart tones first heard with Doppler (12- 14 weeks)
- e. date of quickening (usually 18-20 weeks in a primagravida and 16-18 weeks in a multigravida)
- f. sonographic parameters - measurement of the biparietal diameter is most accurate for pregnancy dating between 16 and 20 weeks gestation.

Management:

1. Antepartum: Appropriate management revolves around identifying low % of fetuses w/ postmaturity syndrome who are at risk of intrauterine hypoxia and fetal demise
 - A. Patient is induced if:
 1. fetal testing is not reassuring
 2. oligohydramnios
 3. favorable cervix (Bishop score of 6 or greater)

Bishop's Scale for Cervical Ripening^a

Factor	Points			
	0	1	2	3
Dilation	Closed	1-2 cm	3-4 cm	5+ cm
Effacement	0-30%	40-50%	60-70%	80+%
Station	-3	-2, -1	0	+1, +2
Consistency	Firm	Medium	Soft	
Position	Posterior	Mid	Anterior	

^a A score of 0 to 4 points is associated with the highest likelihood of failed induction; a score of 9 to 13 points is associated with the highest likelihood of successful induction.

- B. Patient w/good dates at 41 weeks w/unripe cervix :
 1. Expectant approach--
 - a. weekly NST, weekly CST's at UAB
 - b. biophysical profile (components include NST, fetal tone, fetal breathing, fetal motion, and quantity of amniotic fluid)
 - c. amniotic fluid index (AFI)
 2. Delivery is indicated if--
 - a. AFI <5 (oligohydramnios) or FHR decels
 - b. otherwise, if fetal parameters (NST, AFI) are reassuring, labor IS NOT INDUCED unless cervix becomes favorable or GA is 42 weeks.
 - c. At 42weeks, delivery should be considered regardless of other factors due to increase chance of perinatal morbidity and mortality.
 - C. Patient with uncertain GA seen for the 1st time with possible or probable prolonged gestation:
 1. Expectant approach: Most will go into spontaneous labor
 2. The pregnancy should simply be monitored (as above in B) as long as the fetus is doing well.
2. Intrapartum:
 1. continuous fetal monitoring during labor induction
 2. pt in left lateral decubitus position

3. rupturing of fetal membranes in active labor to allow internal monitoring (if needed) and assessment of amniotic fluid (+/- meconium)
4. if distress, immediate c/s if more conservative measures fail (positioning, oxygen, etc)
5. if meconium present, follow appropriate protocol

27. Postpartum Hemorrhage: L&D nurse calls you to see a 20 year-old Becky, G3 now P3, one hour post vaginal delivery because of excessive bleeding.

Definition:

Excessive bleeding (blood loss > 500cc for Vaginal delivery, >1000cc for c/s) in the minutes to hours following delivery. Considered Early PPH if < or =24Hr, or late if >24 Hr to 6wks PP. Can be sudden and profuse or prolonged and persistent.

Pathophysiology/DDx

More likely causes--

1. Uterine Atony is #1 cause.
 - This is failure of the uterus to undergo normal involution postpartum.
 - The primary physiological mechanism to stop bleeding postpartum is the clamping down of the uterus, causing constriction of the spiral arteries to prevent bleeding from the placental implantation site.
2. Lacerations of vulva, vagina, or cervix
3. Retained placenta or placental fragments.
 - a. placenta accreta- abnormal adherence of placenta to uterine lining
 - b. placenta increta- partial penetration of placenta into uterine muscle
 - c. placenta percreta- complete invasion of placenta through entire myometrium

Less Likely causes--

4. Hematomas- caused by shearing forces of baby or forceps during delivery
5. Coagulopathies-
 - a. DIC- from abruptio placenta
 - amniotic fluid embolism
 - severe preeclampsia
 - b. any congenital or acquired coagulopathy
6. Subinvolution of the uterus
7. Uterine rupture
8. Uterine inversion

History:

1. Uterine Atony: ask about *risk factors*--
 - Pt. experience prolonged or precipitous labor?
 - Was pt labor augmented with Pitocin?
 - Is pt. multiparous?
 - Did pt. have polyhydramnios, multiple gestation, amnionitis?
 - Was Mg Sulfate used?
 - Was fetus macrosomic?
 - Pt. have H/O uterine masses (e.g. leiomyoma)?
 - Did pt have chorioamnionitis?
2. Lacerations:
 - What was route of delivery?
 - Were forceps, or vacuum assistance needed?
 - Was labor precipitous?
 - Macrosomic infant?
 - Breech delivery?
3. Retained placenta:
 - Was delivery of placenta difficult?
 - Was delivered placenta intact?
 - Pt. with H/O prior c/s, uterine curettage, or uterine leiomyoma?

4. Coagulopathy:
 - Pt have H/O preeclampsia or abruptio placenta with this delivery?
 - Pt with any genetic coagulopathy?

Physical Exam:

- General: look for signs of shock (Tach, BP, and Tilt)
- Abdomen: palpate for “boggy” fundus (of atony or subinvolution).
- Pelvic: examine cervix, vagina, and external genitalia for lacerations or hematomas. Can perform bimanual exam to palpate uterus and adnexa. Pelvic mass palpated lateral to uterus is suggestive of broad ligament hematoma of uterine rupture.

Workup:

1. CBC
2. coags- plt count, PT PTT, fibrinogen, fibrin split products
3. examine placenta for intactness
4. pelvic US- can detect broad ligament hematoma

Management:

1. If suspect massive blood loss
 - a. **Large Bore IV Access**
 - b. Type and Cross
2. Ut. Atony:
 - a. prevent with routine 20 units/L of PIT after delivery of placenta
 - b. Vigorous uterine massage
 - c. if still boggy can give another 20 units of PIT up to total of 80units/L
 - d. Methergine 0.2mg IM (contraindicated in pt with HTN)
 - e. Prostaglandin F 2alpha 0.25mg IM injection (contraindicated in patients with asthma)
 - f. Surgery (=last resort):
 - ut. a. ligation
 - hypogastric a. ligation (not generally a good option)
 - selective arterial embolization, or hysterectomy
3. Lacerations:
 - a. repair
 - b. evacuation of expanding hematomas
 - c. vaginal packing
 - d. arterial angiographic embolization
4. Retained placenta
 - a. manual removal
 - b. uterine d&c
5. Coagulopathy
 - a. correct underlying cause
 - b. transfuse with whole blood
 - c. transfuse plt's and fresh frozen plasma
6. Ut. rupture: immediate laparotomy with either repair of rupture or hysterectomy
7. Ut. inversion:
 - a. manual replacement of uterine fundus with fingers or palm of hand, do NOT give PIT until uterus repositioned
 - b. last resort- emergency laparotomy with use of traction sutures to replace uterine fundus

29. Premature Rupture Of Membranes: 22 year old Dana, G1 P0, at 27 weeks gestation comes to your office stating she had a gush of fluid from the vagina 2 hours ago. Her perineum is grossly wet.

Definition: Rupture of the chorioamniotic membrane before the onset of labor, occurring in approximately 10-15% of all pregnancies.

- PPROM: preterm pt with PROM with or without contractions

Pathophysiology: Etiology is not clearly understood.

- STDs are thought to play a role, as well as subclinical intraamniotic infection, where bacterial metabolites may weaken the fetal membranes or initiate uterine contractions by stimulating prostaglandin synthesis.
- Preterm contractions may also initiate the chain of events by dilating the cervix and allowing the fetal membranes to be exposed to infectious agents. The triad of PROM, preterm labor, and infection is poorly understood.
- Major Threats to Fetal Life:
 - 1) Prematurity
 - 2) Sepsis
 - 3) Fetal Distress
 - 4) Fetal Deformations
- Major Threat to Maternal Life: sepsis secondary to chorioamnionitis

Risk Factors for PROM:

- 1) local infection (vaginal, cervical, chorioamnionitis)
 - N.gonorrhoeae
 - Chlamydia
 - Gp B strep,
 - Gardnerella vaginalis
- 2) Multiple gestation
- 3) Polyhydramnios
- 4) Incompetent cervix/ Cervical cerclage
- 5) Previous cervical laceration or operation
- 6) Smoking
- 7) Drug use: cocaine
- 8) Prior h/o PROM
- 9) Trauma

Differential Diagnosis:

Most likely cause--

1. PROM
 - pt c/o gush of fluid from vagina with ongoing leakage is PROM in 90% of cases
 - Fluid passing through vagina must be assumed to be amniotic until proven otherwise

Less likely causes--

2. leakage of urine
3. excessive normal (or infectious) vaginal d/c
4. bloody show associated with labor

History:

- Ask about Risk Factors.
- Always ask about gestational age and time and date of rupture.
- The longer the time, the more increased risk for subsequent chorioamnionitis, fetal infections, and fetal deformation.

Physical Exam:

1. Check for signs of chorioamnionitis (uterine tenderness, maternal/ fetal tachycardia, maternal fever, fetal distress, purulent amniotic fluid)
2. Perform sterile speculum exam:
 - Watery d/c may be noted externally or in vaginal pool.
 - May be observed flowing from the cervical os with fundal pressure or Valsalva maneuver.
 - Cervical dilatation and effacement may be seen . Do **NOT** perform digital cervical exam on pt with preterm PROM who is not in labor.

Workup:

- 1) Nitrazine test: if fluid turns nitrazine paper blue (ph>6.0) then suspect amniotic fluid (nl vaginal ph 4.5-6.0, amniotic fluid ph 7.1-7.3).
 - Can get false + from semen, blood, infection, or alkaline antiseptics in vagina
- 2) Microscopic slide test for ferning of vaginal fluid (indicates PROM)

- 3) U/S: look for low amniotic fluid index, determine gestational age and presentation of fetus
- 4) Tests to r/o chorioamnionitis
 - i) CBC with Diff
 - ii) amniocentesis & culture of amniotic fluid (used infrequently)
- 5) Cervical cultures to r/o STD and Gp B strep, treat with appropriate Abx to decrease risk of perinatal transmission
- 6) Fetal well being by NST
- 7) Fetal lung maturity:
 - test amniotic fluid for PG and L/S ratios: pool PG usually collected after 32 weeks
 - + PG and L/S >2.0 is very reassuring
 - presence of blood in amniotic fluid increases L/S ratio, meconium decreases L/S ratio, neither affects PG but PG matures one week later than L/S.
 - only PG is used for pooled vaginal fluid; PG and L/S can be done if amnio performed

Management:

1. Preterm PROM not in labor (**this pt**):
 - a. Major risk is prematurity, so goal is to prolong pregnancy until fetal lung maturity is obtained.
 - b. If no infection can be managed as inpatient (rule out Chorio, PTL, abruption)
 - i) Prophylactic Abx (ampicillin/azithromycin)- decreases infection and prolongs onset of labor by 5-12 days
 - ii) order bedrest
 - iii) pt Temp check QID
 - iv) daily NST, q4 hr FHR check, U/S q 3-4 wks
 - v) avoid digital cervical exams until pt in labor
 - vi) obtain vaginal pool fluid for PG when \geq 32 wks
 - vii) deliver if:
 - a) fetal lung maturity attained
 - b) maternal or fetal compromise
 - c) infection
2. PROM with advanced labor, chorioamnionitis, or fetal distress should undergo delivery **regardless** of gestational age

34. Preterm Labor: 24 year-old Lorna G2 P1 at 28 weeks gestation by dates (but no prenatal care) presents at L&D with regular contractions every 5 minutes.

Definition: Preterm labor is defined as that occurring after 20 wks and before 37 wks of gestation

Etiology:

- ~incidence averages about 7%
- ~idiopathic - 50%
- ~multiple gestation - 10-15%
- ~medical indications for induction - 5-20%
- ~uterine anomalies - 5-15%
- ~misc (infection, polyhydramnios, incompetent cervix) - 5%

Risk Factors (to be assessed during history):

1. Low socioeconomic status (and black race -- 2x higher rate than white race)
2. Previous preterm delivery (risk increases with # of preterm deliveries)
3. Previous 2nd-trimester abortion(s), risk after induced 1st-trimester AB is controversial
4. Repeated spontaneous 1st-trimester AB
5. Other med/OB factors including 1st-trimester bleeding, UTIs, multiple gestation, uterine anomalies, polyhydramnios, incompetent cervix
6. Smoking more than a half a pack a day
7. DES exposure in utero
8. History of cone biopsy

Diagnosis:

- ~Unless contraindicated, vaginal exam to assess cervical length, dilatation, and station
- ~Rule out cystitis, pyelonephritis, ureteral stones, and bowel disorders, all of which can mimic the symptoms of preterm labor and can actually be assoc with contractions
- ~Recheck dates to confirm labor is actually preterm, US to see if size agrees with dates
- ~Assess for underlying infection
- ~Pts presenting before 37 wks who are 2 cm or more dilated, having contractions, and more than 80% effaced are likely to be in labor
- ~Regular contractions (8 or so in 1 hr) in the presence of ROM may also be regarded as labor

Management:

- A. CBC, FBP, U/A, urine C&S, random glucose once diagnosis of preterm labor has been made
- B. Hydration and sedation - will stop contractions in 20%
- C. Tocolytic therapy:
 - [*contraindications include severe pre-eclampsia, severe bleeding from placenta previa or abruption, chorioamnionitis, IUGR, fetal anomalies incompatible with life or fetal demise*]
 - 1. Beta agonists (Terbutaline)
 - increases cAMP which decreases the availability of free calcium, therefore decreasing contractions
 - side effects include CV (incr HR, SBP; decr DBP; CP, myocard ischemia, arrhythmias), pulmonary edema (rare), hyperglycemia, hypokalemia due to increased insulin release
 - placental transfer occurs, but fetal effects are delayed
 - 2. MgSO₄
 - drug of choice in pts with DM or heart disease
 - competes with Ca for entry into the cell at depolarization causing a decr in intracellular Ca, resulting in myometrial relaxation
 - side effects include feeling of warmth and flushing on first administration, respiratory depression at levels of 12-15mg/dl, and cardiac conduction defects and arrest at higher levels
 - low calcium in fetus may occur with loss of muscle tone and drowsiness in neonate (resulting in lower Apgar score)

3. PG Inhibitors (indomethacin) : use prior to 30-31 weeks
 - PGs induce contractions
 - side effects include oligohydramnios, premature closure of fetal ductus which may lead to neonatal pulmonary hypertension and cardiac failure, platelet dysfunction, increased bleeding during delivery and postpartum
4. Ca⁺⁺ channel blockers (nifedipine)
 - relaxes myometrial tissue
 - side effects relate to CV effects and include tachycardia and hypotn in mother and neonate (hypoxia and fetal acidemia leading to fetal death have also been reported)
- D. Glucocorticoids
 1. enhance fetal lung maturity to decrease RDS
 2. effective at less than 33 wks, females benefit more than males, black infants benefit more than white infants
- E. Delivery - vaginal if vertex and in no distress; generally, C/S if breech, less than 1500gm (individualized)

37. Puerperal Infection: 29 year-old Babette, G3 now P3, is 36 hours post low mid-forceps delivery of a 3950 g male neonate following a 4 hour second stage of labor. The maternity unit nurse notifies you Babette has a temperature of 103.4 °F.

Definition: a puerperal *fever* is a temperature of 100.4 °F (38.0 °C) or higher on any 2 occasions of the first 10 days postpartum, *excluding* the first 24 hours. An *infection* is presumed when other causes are not apparent. [practically speaking, treatment is often instituted for significant elevations of temperature *within* the 1st 24 hours, especially when accompanied by other evidence of infection]

Differential Diagnosis:

1. **Metritis:** post-delivery infection of the uterine lining that often extends into the myometrium. Usually presents day 2-5 post-delivery, and is diagnosed when a postpartum *fever* is *accompanied by uterine tenderness*. The most important risk factor is *route of delivery*: the incidence is 25-50% following a C-section, and only 1-6% after spontaneous vaginal delivery. Infections are polymicrobial, and single-drug (e.g., Cefotan or Ancef) or multiple-drug (e.g., Clindamycin-gentamicin) regimens may be used.
2. **Urinary tract infections:** usually present on the 2nd day postpartum, and are more common if a Foley catheter was inserted (e.g., for a C-section or epidural anesthesia). Diagnosis requires a degree of suspicion: *dysuria* may not be present (due to decreased sensitivity of the bladder after delivery), and *urinary frequency* is a common postpartum finding. Costovertebral angle tenderness may suggest an upper UTI (pyelonephritis).
3. **Mastitis:** often characterized by a significant fever (103 °F or more), but usually presents late in the puerperium. Other symptoms include breast tenderness and erythema, malaise, and general body aching.
4. **Wound infection:** in spite of bacterial contamination, infections of an episiotomy site are very uncommon (< 0.25%). Infection of the incision site following C-section is also relatively uncommon (<10% of cases). These infections usually present on the 3rd to 4th day postpartum. Necrotizing fasciitis is a rare but deadly infection (50% fatality rate) that may occur in the perineum or abdomen.
5. **Other infection:** *pelvic thrombophlebitis* is an uncommon infection that is the sequelae of pelvic infection. It usually presents as persistent (days 4-10) fever and tachycardia following several days of antibiotic treatment. Latent *pulmonary TB* may be activated by lowering the diaphragm following delivery. *Pelvic abscesses* are also possible.
6. **Atelectasis:** common if general anesthesia was used (e.g., w/ a C-section); usually presents 1st day post-op.
6. **Pneumonia:** uncommon, usually seen in those with pre-delivery respiratory disease; *aspiration pneumonia* more likely with general anesthesia; usually presents 1st day post-op.

7. DVT

Remember the 5 W's: wind, water, wound, walking, wonder drugs

History:

What significant medical history does the mother have? Were there any complications during pregnancy?	Predisposing factors to postpartum infections include obesity, low socioeconomic status, anemia, immunosuppression, chronic disease (e.g., diabetes mellitus), and vaginal infection (esp. bacterial vaginosis).
What is the Hx of the Labor and delivery?	Rupture of fetal membranes, intraamniotic infection, prolonged labor, multiple pelvic exams during labor, internal electronic fetal monitoring, and Cesarean birth all predispose to infection.
What other significant complaints has the patient had since delivery?	Pay special attention regarding pulmonary symptoms, urinary tract disturbance, and abdominopelvic pain/tenderness.

Physical Exam:

Examination should include the lungs, the back (for costovertebral tenderness), palpation of the abdomen, careful inspection of the incision site, a check for the presence of bowel sounds, examination of the perineum (if an episiotomy was performed or if a laceration occurred), a pelvic examination, assessment for calf tenderness, and inspection of any intravenous site. Although a pelvic examination may not elicit any findings other than uterine tenderness, one can confirm that lochia drainage is, in fact, occurring and baseline information can be obtained concerning adnexal masses that may be important if the fever persists and an abscess develops.

Management:

Blood cultures are not usually obtained unless the infection appears severe, sepsis is suspected, fever is especially high, or the response to limited therapy is delayed. Antibiotic therapy will depend upon the most likely etiology of the infection; possible regimens include the following: dicloxacillin for mastitis, ceftriaxone/erythromycin for pneumonia, and gent/clindamycin for metritis. Rarely, heparin may be given for pelvic thrombophlebitis.

39. Rectovaginal Fistula: 31 yo Barbara, G1 P0, 3 weeks post vaginal delivery and 4th degree laceration comes to your office complaining of what looks and smells like stool in her vagina.

Definition: abnormal communication between the rectum and vagina resulting in fecal incontinence through the vagina

History: important questions include:

- Has pt recently had an episiotomy or laceration?
 - 1st lac: tear involves vaginal mucosa
 - 2nd lac: tear through vaginal mucosa w/ intact perineal body
 - 3rd lac: through anal sphincter
 - 4th lac: tear involving rectal mucosa
 - usually due to inadequate repair or breakdown of 4° episiotomy/laceration
- Has pt had infection in the episiotomy repair site?
- H/O cervical CA? (possible local extension and fistula formation or necrosis due to radiation tx)

Physical Exam:

- Rectovaginal exam to determine extent & location of fistula
 - Traumatic lesions usually near vaginal opening; look for suture placed through rectal wall during repair or undetected rectal injury from delivery
 - May use probe or radiopaque dye to further delineate fistula
 - radiation & CA lesions are "higher up"

Management: Surgical repair

1. bowel prep, enema
2. NPO
3. prophylactic Abx
4. may require pre -op colostomy if complicated.