Chapter 176 – Acute Complications of Pregnancy

Episode Overview:

1) List 6 causes of first trimester bleeding.
2) List 5 RFs for miscarriage. What percentage of women who have bleeding miscarry?
3) Describe the diagnosis of miscarriage.
    a. What are 3 treatment options?
4) List 5 sonographic criteria for abnormal pregnancy with TV US.
5) List 6 RFs for ectopic pregnancy. What is the risk of heterotopic pregnancy in assisted reproduction?
6) On US, list 3 diagnostic criteria for IUP, 5 findings suggestive of ectopic, and 4 indeterminate findings.
7) Describe an algorithm for the management of 1st trimester bleeding in relation to potential ectopic preg.
8) List 4 features of Hx that suggest a molar pregnancy. What is the primary diagnostic test? List 3 complications of a molar pregnancy.
9) List 6 DDx for bleeding in late (2nd and 3rd trimesters) pregnancy.
10) List 6 RFs for placental abruption. Differentiate clinically between a placental abruption and a placenta previa. What is the management bleeding in late pregnancy?
11) Define Gestational HTN, Pre-eclampsia, and Eclampsia.
12) List 6 RFs for pre-eclampsia and 5 complications of pre-eclampsia
13) Describe the management of eclampsia and severe pre-eclampsia.
14) What is HELLP syndrome?
15) What is the treatment of iatrogenic magnesium toxicity?
16) What are 4 potential precipitants of an amniotic fluid embolism? What is the management?
17) In whom is RhoGam indicated? What is the dose?
18) How is appendicitis different in pregnancy? How is it diagnosed?
19) List 3 causes of pain in the RUQ in pregnancy. What is the management of each?
20) List 4 safe IV meds and 1 PO medicine used in the management of hyperemesis gravidarum. In what weeks is it most common.
21) Describe the diagnosis and management of PE and DVT in pregnancy
22) Describe the management of UTI in pregnancy. What are the risks of asymptomatic bacteriuria?

Wisecracks

1. What US findings are:
    a. Consistent with ectopic pregnancy
    b. Suggestive of ectopic pregnancy
    c. Consistent with intrauterine pregnancy
    d. Indeterminate
2. What are the management options for ectopic pregnancy?
3. List types of gestational trophoblastic disease. (shownotes)
4. What is vasa previa? (shownotes)
5. Which life threatening causes of headache have altered risk in pregnancy?
6. Why are pregnant patients at increased risk of VTE?
7. List the risk factors for peripartum cardiomyopathy. During which time period do these patients present.
8. Describe the management of bacterial cystitis and pyelonephritis during pregnancy.
9. How are BV, vaginal yeast infections and trichomonas infections managed during pregnancy? (shownotes)

10. List the foetal complications of n. gonorrhea and c. trachomatis.
11. What is chorioamnionitis? What organisms are pathogenic? How is it treated? What are the risk factors? (shownotes)
12. List GI complications of pregnancy.

Key Points:

You know a chapter is gargantuan when the summary points are two pages long….so here we go. We'll cover the key, key concepts

Ectopic pregnancy
Bleeding in late pregnancy
Hypertension in pregnancy
AF Embolism
Rh immunization
Abd pain in pregnancy
N/V in pregnancy
VTE in pregnancy
Vaginal and UTIs
Thyroid disease

Ectopic Pregnancy

• An ectopic pregnancy can masquerade as a threatened miscarriage in the early stages of pregnancy and should always be considered in the differential diagnosis.
• The history and physical examination of the patient with ectopic pregnancy are insensitive and nonspecific, pelvic ultrasonography and serum hCG levels are essential to locate the pregnancy **in any patient who has abdominal pain or vaginal bleeding and a positive pregnancy test result.**

Bleeding in Late Pregnancy

• Bleeding during the second trimester (14–24 weeks) is not benign and is associated with a 33% risk of fetal loss. Management is supportive and expectant.
• Think: abruptio placentae and placenta previa. *Patient history, physical examination, and results of ultrasonography can be used to distinguish them.*
• All patients with painless, second-trimester vaginal bleeding should be assumed to have placenta previa until proven otherwise. Digital or instrumental probing of the cervix should be avoided until the diagnosis has been excluded via ultrasound.
• Abruptio placentae has a wide spectrum of severity of symptoms and risk. Up to 20% of women will have **no pain** or vaginal bleeding. Assessment is generally based on clinical features, coagulation parameters, and signs of fetal distress.

Hypertension in Pregnancy

• Gestational hypertension occurs during pregnancy (>20wks), resolves during the postpartum period and equals a new blood pressure reading of 140/90 mm Hg or higher.
• Preeclampsia is gestational hypertension with proteinuria (>300 mg/24 hr); eclampsia is the occurrence of seizures in the patient with signs of preeclampsia.
• The HELLP syndrome is a particularly severe form of preeclampsia characterized by hemolysis, elevated liver enzyme levels (ALT and AST > 70U/L), and low platelet count (<100,000/mL).

Amniotic Fluid Embolism

• Amniotic fluid embolus should be suspected during the second or third trimester of pregnancy, particularly in the setting of uterine manipulation or contraction, when a patient experiences sudden hypotension, hypoxia, and coagulopathy.
• Treatment of amniotic fluid embolus consists of ACLS care *(oxygenation and ventilation, aggressive fluid resuscitation, inotropic cardiovascular support)* and anticipation and management of consumptive coagulopathy.

Rh Immunization

• Rh immunization occurs when an Rh-negative woman is exposed to Rh-positive fetal blood. To prevent this, a dose of 50 µg of Rh immune globulin can be used if the patient is at less than 12 weeks of gestation. After 12 weeks, a 300-µg dose should be given.

Abdominal Pain in Pregnancy

• Appendicitis is the most common surgical emergency in pregnancy. Clinical presentations may be atypical. Cholelithiasis presents with similar symptoms to those in nonpregnant women and is similarly diagnosed through ultrasound. Surgery, if required, is optimally done during the second trimester.
• Hepatitis is the most common cause of liver disease in pregnancy;
• Acute fatty liver of pregnancy is a rare disorder of the third trimester that can result in hepatic failure, complicated labor, and fetal mortality. Coagulopathy, jaundice, seizures, DIC, and hepatic encephalopathy may also result.
• Intrahepatic cholestasis of pregnancy typically presents with generalized pruritus and mild jaundice.

Nausea and Vomiting in Pregnancy

• Hyperemesis gravidarum is defined as nausea and vomiting that cause starvation metabolism, weight loss, dehydration, and prolonged ketonemia and ketonuria. Initial management involves rehydration with IV fluids, antiemetics, and demonstration of ability to take oral hydration.

Thromboembolism in Pregnancy

• Thromboembolic disease accounts for almost 20% of obstetric mortality, making it the leading cause of death in pregnancy.
• Doppler ultrasonography is the first-line test for the diagnosis of DVT. CT angiography and lung scintigraphy are used for the diagnosis of PE.
• Low-molecular-weight heparin is preferred for anticoagulation.

Vaginal and Urinary Tract Infections

• Asymptomatic bacteriuria in pregnancy predisposes the patient to the development of symptomatic lower and upper tract genitourinary infections.
• Regarding the treatment of sexually transmitted diseases, in general, the tetracyclines and quinolones are contraindicated in pregnant patients. Treatment of genital tract infections may be important for preventing preterm labor and decreasing transmission to the infant.
• PID is very rare in pregnancy and does not occur after the first trimester. Given the risk of endometrial infection in pregnancy and the need to consider other diagnoses, pregnant patients who have suspected PID require hospitalization and IV antibiotics.

• Chorioamnionitis is diagnosed by the findings of fever, maternal and fetal tachycardia, and uterine tenderness in a patient past 16 weeks of pregnancy. Patients are usually treated with IV ampicillin and gentamicin.

Thyroid Disease

• Postpartum thyroiditis is characterized by transient hyperthyroidism and/or hypothyroidism in the postpartum period.
• Confirmation of hypothyroidism is based on an elevated serum TSH level, relying on trimester-specific TSH reference ranges.
• Hyperthyroidism may be associated with a hydatidiform mole and usually resolves with evacuation of the mole.
• Patients may present with signs of thyroid storm, including altered mental status, severe tachycardia, and signs of high-output heart failure (eg, edema, dyspnea, orthopnea).

Rosen's in Perspective

Topics to be covered:

- Ectopic pregnancy
- Bleeding in late pregnancy
- Hypertension in pregnancy
- AFE
- Rh immunization
- Abd pain in pregnancy
- N/V in pregnancy
- VTE in pregnancy
- Vaginal and UTIs
- Thyroid disease (shownotes)

1) List 6 causes of first trimester bleeding.

Thinking outside in:

- Other pelvic source - rectal vs. urinary
- External/internal labia
- Introitus source
- Vaginal wall / vault
- Cervix
- Intrauterine
    - Miscarriage
    - Implantation bleeding
    - Molar pregnancy

Or worst first:

- Ectopic
- Miscarriage
- Molar pregnancy
- Cervical lesion (cancer)
- Coagulopathy

2) List 5 RFs for miscarriage. What percentage of women who have bleeding miscarry?

- Increased maternal age (especially > 40 yrs)
- Increasing parental age
- Increased parity
- Hx of prior miscarriage
    - Multiple associations*
- Hx of vaginal bleeding
- ETOH use
- Poorly controlled disease
    - Diabetes
    - Thyroid disease
    - Obesity
- Low prepregnancy BMI
- Maternal stress

**Maternal factors that increase the risk of miscarriage include congenital anatomic defects, uterine scarring, leiomyomas, and cervical incompetence. Other conditions associated with increased miscarriage rates include toxins (eg, alcohol, tobacco, and cocaine), autoimmune factors, endocrine disorders including luteal phase defects, a prior history of miscarriage, and occasional maternal infections.*

Approximately 80% of miscarriages occur during the first trimester; the rest occur before 20 weeks of gestation.

Approximately 25% of clinically pregnant patients experience some bleeding. ***It is estimated that up to 50% of all women who have bleeding during early pregnancy miscarry, although the risk is probably higher in the emergency department (ED) population.***

Important to discuss with most women that usually fetuses are non-viable 1-2 weeks before the bleeding occurs.

3) Describe the diagnosis of miscarriage.

Miscarriage = spontaneous termination of pregnancy BEFORE 20 WEEKS gestation = #1 complication of pregnancy

- Usually due to a uterine malformation or chromosomal problem in the unborn
- After 20 weeks =premature birth

Typically three categories:

- **Threatened - vaginal bleeding and closed INTERNAL cervical os**
    - **Considered “inevitable miscarriage” if the os is open**
- **Incomplete - vaginal bleeding and products of conception are visible**
- **Completed - when the uterus has expelled all fetal and placental material, the cervix is closed, and the uterus is contracted (not an ED diagnosis)**

Other terms:
Missed abortion is a relatively obsolete term referring to the clinical failure of uterine growth over time. The terms anembryonic gestation (when no fetus is visualized on ultrasound), first- or second-trimester fetal death (failure to see fetal cardiac activity with at least a 5-mm crown-rump length), and delayed miscarriage are more appropriate.

The severity of symptoms does not correlate well with the risk of miscarriage, although cramping and passage of clots are thought more likely to occur as the miscarriage becomes inevitable.

a. **What are 3 treatment options? (assuming pt is stable)**
    i. **Examination & blood sampling (consider Hgb) and Rh status, followed by Ultrasound and <u>expectant management</u>**
        1. **<u>Good return instructions re: ectopic pregnancy risk and red flags</u>**
        2. Patient education and support
        3. Normal moderate daily activities
        4. Avoid tampons, intercourse
        5. *Cramping from a known IUP can be safely treated with oral synthetic narcotics, if needed.*
    ii. **Incomplete miscarriage treatments:**
        1. **Expectant management**
            a. **As discussed above**
            b. **Removal of fetal tissue from the cervical os (tissue can be sent to the pathology department for analysis)**
            c. **Follow-up and serial hormonal assays**

            Up to 80% of women with first-trimester miscarriage complete the miscarriage without intervention.

        2. **Medical management**
            a. **Misoprostol**
        3. **Surgical evacuation with D&C**

Assessment below:
*The assessment of the patient who experiences first-trimester vaginal bleeding includes a careful abdominal examination to **evaluate for tenderness or peritoneal irritation from a potential ectopic pregnancy** and to determine the size of the uterus, which should not be palpable abdominally. **A pelvic examination** should be performed to evaluate:*

- *Whether the cervix is closed or open, look for clots or the products of conception, and determine the degree of vaginal bleeding, as well as uterine size and tenderness.*

*The cervix should be gently **probed with a ring forceps** (not a cotton-tipped applicator) to determine whether the internal os (1.5 cm deep to the external os) is open or closed. This is unnecessary in the patient who has a clearly open os or visible products of conception but can be safely performed during the first trimester as long as the forceps are used gently and do not penetrate the cervix more than 2 or 3 cm.*

In the patient with second-trimester bleeding, probing should not be done because the uterus is more vascular, and the organized placenta may overlie the cervical os.

Parous women normally have an open or lax external os, a finding of no significance. The adnexa may be enlarged, often unilaterally, because the corpus luteum is cystic or because the pregnancy is ectopic. Significant adnexal or uterine tenderness should always raise the possibility of an ectopic pregnancy. Much less commonly, pelvic infection can cause uterine and adnexal tenderness during early pregnancy.

4) List 5 sonographic criteria for abnormal pregnancy with TV US.

When can we order an ultrasound and expect to find an answer?

- ***Discriminatory levels are operator- and equipment-dependent and vary by individual patient characteristics, but***
    - ***Are usually considered to be 6500 mIU/mL for transabdominal ultrasonography***
    - ***1000 to 2000 mIU/mL for transvaginal ultrasonography, usually 5-6 weeks from LMP***

  Ultrasonography can be performed or repeated when hCG levels rise to 1500 to 3000 mIU/mL.

Think "outside in"

- No gestational sac despite HCG of 3000 mIU/mL
- No fetus with Gest. sac of 25 mm
- No yolk sac with gestational sack of 13 mm
- No fetal heart tones
    - At 10-12 weeks
    - With 5 mm CRL

Box 178.1 – Sonographic Criteria for Abnormal Pregnancy with Transvaginal Ultrasound

- No gestational sac at B-hCG level of 3000 mIU/mL
- No yolk sac with gestational sac of 13mm
- 5mm crown-rump length, with no fetal heart tones
- No fetus, with gestational sac of 25mm mean diameter
- No fetal heart tones after gestational age of 10-12 weeks

5) List 6 RFs for ectopic pregnancy.

It is the third leading cause of maternal death, responsible for 4% to 10% of maternal mortality. Ectopic pregnancy is estimated to account for approximately 2% of all pregnancies **but may be as high as 10-16% in women presenting to the ED with vaginal bleeding or pain.**

- Older women
- Women of minority groups
- Previous ectopic pregnancy
- Prior spontaneous abortion
- Medically induced abortion
- History of infertility
- IUD
- Smoking
- Prior tubal infection (50% of cases)
    - PID
- Anatomic abnormalities of the fallopian tubes,
- assisted reproduction (especially multiple embryo transfers),
- abnormal endometrium (host factors).
- Prior tubal surgery (tubal sterilization, removal of previous ectopic)

What is the risk of heterotopic pregnancy in assisted reproduction?

Simultaneous intrauterine and extrauterine gestations (heterotopic pregnancy) have historically been rare, occurring in approximately 1 in 4000 pregnancies; more recently, women who have undergone assisted reproduction techniques with embryo transfer have a demonstrated risk of 4% or higher of one of the pregnancies being ectopic.

6) On US, list 3 diagnostic criteria for IUP, 5 findings suggestive of ectopic, and 4 indeterminate findings.

Table 178.3

	IUP	**Abnormal/ indeterminate***	**Ectopic** **Red = diagnostic** **Yellow = suggestive**
Quant HCG	Usually > 1000-2000 mIU/mL	Usually < 1500 mIU/mL	Any value; < 1000 mIU/mL increases the risk of ectopic pregnancy four fold
Location	**Intrauterine fetal pole**	**Empty uterus** **Non-specific fluid collections** **Echogenic material**	• **Moderate or large cul-de-sac fluid without intrauterine pregnancy** • **Adnexal mass without intrauterine pregnancy** • **Pregnancy in fallopian tube** • **Ectopic fetal pole**
Gestational sac	**Double gest. Sac sign**	**Abnormal sac / pseudo sac** **Single sac**	
Yolk Sac	**Intrauterine**	**Abnormal sac**	
Fetal heart	**Intrauterine fetal heart activity**	**Not found**	**Ectopic fetal heart activity**

***In one series of more than 1000 pelvic ultrasound examinations, 53% of indeterminate ultrasound studies resulted in a diagnosis of embryonic demise, 15% were ectopic pregnancies, and only 29% had an IUP.*

7) Describe an algorithm for the management of 1st trimester bleeding in relation to potential ectopic preg.

Because the history and physical examination of the patient with ectopic pregnancy are insensitive and nonspecific, ancillary studies are essential to locate the pregnancy in any patient who has abdominal pain or vaginal bleeding and a positive pregnancy test result.

Let's divide this into the stable vs. unstable patient

STABLE (Fig 178.6)

- Notice that the ultrasound happens despite the value of the quantitative bHCG; the point is that we are NOT trying to find a live IUP, instead we are trying to exclude the possibility of this patient having an ectopic
- Medical management is a safe and cost-effective treatment for the stable patient with minimal symptoms, especially when future fertility is desired.
    - Methotrexate is the drug most commonly used to treat early ectopic pregnancy.
    - It interferes with fetal DNA synthesis and causes destruction of rapidly dividing fetal cells and involution of the pregnancy.
    - Medical treatment is used most often for patients who are:
        - hemodynamically stable,
        - with a tubal mass smaller than 3.5 cm in diameter,
        - no fetal cardiac activity,
        - no sonographic evidence of rupture.

Every stable patient who is discharged before U/S performed should receive "ectopic precaution" discharge instructions

***UNSTABLE* = hypovolemic shock; peritoneal signs on examination with free fluid in abdomen**

- *Less common presentation*
- *MOVIE*
    - *Blood products* - initiate type and screen
- Call Obs/Gyne surgeon - for surgical management
    - Consider TXA
    - RhIG 50 mcg if Rh negative

Remember:

- *Even if exceedingly low, there is no value in using a single hCG measurement to exclude the diagnosis of ectopic pregnancy.*
    - Even serial measurements can be falsely reassuring when the ultrasound is indeterminate
- *Bleeding and other symptoms are usually intermittent*
    - *50% have no risk factors; 15% have not missed a menstrual period*
    - *Adnexal masses are felt in only 10% to 20% of patients with ectopic pregnancy.*
- *Three outcomes are possible—spontaneous involution of the pregnancy, tubal abortion into the peritoneal cavity or vagina, or rupture of the pregnancy with internal or vaginal bleeding.*
- *Implantation in the uterine horn (cornual pregnancy) is particularly dangerous because the growing embryo can use the myometrial blood supply to grow larger (10–14 weeks of gestation) before rupture occurs.*

8) List 4 features of Hx that suggest a molar pregnancy. What is the primary diagnostic test? List 3 complications of a molar pregnancy.

Aka. hydatidiform mole = abnormal proliferation of chorionic villi. There are different types: incomplete (some fetal tissue present) or complete (no fetal tissue present).

In approximately 19% of molar pregnancies, neoplastic gestational disease develops, with persistence of molar tissue after the pregnancy has been evacuated. Metastatic disease can develop, requiring chemotherapy and intensive oncologic management.

Hx:

- Extreme maternal age
- Persistent hyperemesis gravidarum
- *bleeding or intermittent bloody discharge,*
- *respiratory distress;*
- *failure to hear fetal heart tones during the second trimester is the usual initial clue to diagnosis.*

If molar pregnancy spontaneously aborts, it is usually in the second trimester (before 20 weeks), and the patient or physician may note the passage of grapelike hydatid vesicles. Uterine size is larger than expected by date (by >4 weeks) in approximately 30% to 40% of patients. Theca lutein cysts may be present on the ovaries as a result of excessive hormonal stimulation, and torsion of affected ovaries can be seen.

Diagnosis:

- **Hydropic vesicles in the uterus (snowstorm) on ultrasound**
- **Pathologic examination of partial molar pregnancies**

However, ultrasonography is only 58% sensitive, and diagnosis of a partial mole is made in 17% of cases. Up to two-thirds of molar pregnancies are diagnosed by pathologic specimens after miscarriage.

Complications:

- *Preeclampsia or eclampsia, which can develop before 24 weeks of gestation,*
- *Respiratory failure or distress from pulmonary embolization of trophoblastic cells,*
- *Hyperemesis gravidarum,*
- *Significant uterine bleeding, acute or chronic*
- *Trophoblastic disease - systemic invasion*

Following evacuation of a molar pregnancy, patients must be monitored in the outpatient setting for trophoblastic sequelae. Patients are at increased risk of an invasive mole, a benign tumor that invades the uterine wall and metastasizes to the lungs or vagina, or choriocarcinoma, a malignant tumor that invades the uterine wall and disseminates to the lungs, brain, and liver via the patient's vasculature. Patients who present to the ED with complications of bleeding metastases are managed with a combination of chemotherapy, radiation, and surgery.

9) List 6 DDx for bleeding in late (2nd and 3rd trimesters) pregnancy.

This is rare - < 4% of pregnancies.

Think about this list with any woman > 12 weeks!

Ddx:

- Placental abruption
- Placenta previa
- Early labour
- Occult marginal placental separations
- Cervical or vaginal lesions
- Lower genital tract lesions
- Hemorrhoids

Bleeding during the second trimester before the fetus is potentially viable (14–24 weeks) is not benign. One-third of fetuses are ultimately lost when maternal bleeding occurs.

10) List 6 RFs for placental abruption. Differentiate clinically between a placental abruption and a placenta previa.

Risk factors for placental abruption:

- Trauma
  - Don't forget to screen for domestic abuse
- Non-traumatic:
  - Maternal HTN
  - Preeclampsia
  - Age > 35; Age < 20
  - Parity > 3
  - Unexplained infertility
  - Smoking hx
  - Thrombophilia
  - Prior miscarriage
  - Prior abruptio placentae
  - Cocaine use

Placenta previa	**Placental abruption**
Rarely have uterine symptoms **U/S excludes the diagnosis**	**Usually have uterine symptoms** **20% may have no pain or bleeding** **U/S is insensitive to make the diagnosis**
• **Painless, <u>bright red</u> bleeding** • **Uterine irritability (<20% of cases)** • **Usually self limited**	• **Dark vaginal bleeding ~70% of cases** • **Uterine tenderness** • **Abdominal pain (concealed hemorrhage)** • **Uterine contractions** **Late/severe signs:** • **Fetal distress** • **Shock** • **DIC**

What is the management bleeding in late pregnancy?

- If unstable - resuscitate as hemorrhagic shock and give Rhogam
- Initiate continuous fetal monitoring
- Follow coagulation studies and resuscitate accordingly - platelets, PT, PTT, fibrinogen
- *Any women with painless second trimester bleeding should be assumed to have placenta previa till proven otherwise - DO NOT probe the cervix digitally or with instruments (do a a traumatic speculum examination)
- Consultation and management by obstetrics

11) Define Gestational HTN, Pre-eclampsia, and Eclampsia.

Hypertension is observed in up to 8% of pregnancies and is generally divided into several categories:

• *Gestational hypertension occurs during pregnancy, resolves during the postpartum period, and is recognized by a new blood pressure reading of 140/90 mm Hg or higher.*

- According to the SOGC Gestational hypertension occurs after 20 weeks gestation. See: https://sogc.org/clinical-practice-guidelines.html
- Uptodate: Gestational hypertension is a clinical diagnosis defined by the new onset of hypertension (defined as systolic blood pressure ≥140 mmHg and/or diastolic blood pressure ≥90 mmHg) at ≥20 weeks of gestation in the absence of proteinuria or new signs of end-organ dysfunction

• *Preeclampsia is gestational hypertension with proteinuria (>300 mg/24 hr).*

- Dipstick testing is adequate as a screening tool in low risks populations (get more testing if greater than 1+ on urine dip); but 24 hr studies or urine protein to creatinine ratio are more accurate

• *Eclampsia is the occurrence of seizures in the patient with signs of preeclampsia. Progression of preeclampsia to eclampsia is unpredictable and can occur rapidly.*

• *Pregnancy-aggravated hypertension is chronic hypertension, with superimposed preeclampsia or eclampsia.*

• *Chronic or coincidental hypertension is present before pregnancy or persists more than 6 weeks postpartum.* According to the SOGC this will appear before 20 weeks gestation.

12) List 6 RFs for pre-eclampsia and 5 complications of pre-eclampsia

RF:

- Women younger than 20 years,
- Primigravidas,
- Twin or molar pregnancies,
- Hypercholesterolemia,
- Pregestational diabetes,
- Obesity,
- Those with a family history of pregnancy-induced hypertension.

Complications:

- HELLP syndrome
- *spontaneous hepatic and splenic hemorrhage*
- *abruptio placentae*
- Eclampsia (may present up to 4 weeks after delivery)
    - *Maternal complications of eclampsia include permanent CNS damage from recurrent seizures or intracranial bleeding, renal insufficiency, and death.*
- *Neonatal complications:*
    - *placental infarcts, intrauterine growth retardation, premature delivery*

13) Describe the management of eclampsia and severe pre-eclampsia.

The patient who has severe preeclampsia should have an IV line and fetal monitoring initiated. Blood testing should include complete blood cell count, renal function studies, liver function tests, platelet count, and coagulation profile. A baseline magnesium level should also be determined.

Eclampsia and severe pre-eclampsia are managed in the same way!

- **Seizure control**
    - 4 g IV magnesium, followed by 2 g/hr IV
    - Consider other causes - drugs, hypoglycemia

- **If seizures refractory to magnesium:**
    - Obtain CT head to exclude cerebral venous thrombosis or ICH

- **Consider control of hypertension if > 105 diastolic BP and magnesium therapy given:**
    - Hydralazine, 5 mg IV, with repeated doses of 5 to 10 mg IV every 20 minutes as needed to keep the diastolic blood pressure below 105 mmHg

- **Maintain euvolemia**
    - Assess for end organ dysfunction - liver, kidney, heme (CBC, LFTS, Coags, Renal panel)

Facilitate delivery!

Pre-eclampsia:

- Mild:
    - *Documentation of blood pressure and reflexes, weight, and testing to ensure normal end-organ function.*
    - *Limitation of physical activities, including bed rest, is the only demonstrated means of reducing blood pressure and allowing the pregnancy to be sustained longer.*
    - *Definitive treatment is delivery of the fetus, although expectant management is standard in women at less than 34 weeks of gestation. Arrangement for close follow-up is important for patients who are not hospitalized.*

- Mod-Severe (sustained hypertension >140/90 with symptoms of severity = epigastric or liver tenderness, visual changes, severe headache)
    - Assess for end organ dysfunction - liver, kidney, heme (CBC, LFTS, Coags, Renal panel)

14) What is HELLP syndrome?

The HELLP syndrome, a particularly severe form of preeclampsia that develops in 5% to 10% of women who have preeclamptic symptoms,

It is characterized by hemolysis (microangiopathic hemolytic anemia), elevated liver enzyme levels (alanine transaminase [ALT] and aspartate transaminase [AST] > 70 U/L), and low platelet count (<100,000/mL).

Prothrombin time, partial thromboplastin time, and fibrinogen level are normal, and blood studies reveal microangiopathic hemolytic anemia.

15) What is the treatment of iatrogenic magnesium toxicity?

Watch for loss of reflexes, because respiratory depression can follow!

IF toxicity develops:

- Stop the IV infusion!
- Give IV calcium gluconate 1 g; repeat as needed
- Provide supportive care

16) What are 4 potential precipitants of an amniotic fluid embolism? What is the management?

Amniotic fluid embolism is the release of amniotic fluid into the maternal circulation during intense uterine contractions or uterine manipulation at areas of placental separation from the uterine decidua basalis (abruptio placentae), triggering a rapidly fatal, anaphylactoid-type maternal response. Mortality rate - 25%

1. **Post induced abortion**
2. **Post miscarriage**
3. **Spontaneously in 2-3rd trimester**
4. **During uterine contractions in labour (most common)**
5. **After amniocentesis**
6. **After placental abruption (trauma)**

Think of this dx for anyone with cardiovascular collapse - hypotension, hypoxia, coagulopathy - during labour! *Bleeding diathesis may be the initial sign in some women, and DIC occurs in approximately 50%. Seizures can also occur.*

Management:

- *High-flow oxygen,*
- *Support of ventilation and oxygenation with intubation,*
- *Aggressive fluid resuscitation,*
- *Inotropic cardiovascular support,*
- *Anticipation and management of consumptive coagulopathy.*

17) In whom is RhoGam indicated? What is the dose?

Rh immunization occurs when an Rh-negative woman is exposed to Rh-positive fetal blood.

To prevent this, anti-D immune globulin (RhoGAM) is routinely administered to

Any Rh- woman with:

- Risk for spontaneous sensitization
    - At 28 weeks gestation in an Rh- woman with a father who is Rh+ or unknown
- At risk for transplacental hemorrhage:
    - uterine manipulation,
    - threatened miscarriage (even without fetal loss),
    - spontaneous miscarriage,
    - surgery for ectopic pregnancy,
    - Amniocentesis,
- If dose missed at 28 weeks and mother with third trimester bleeding
    - Placental abruption
    - Placenta previa

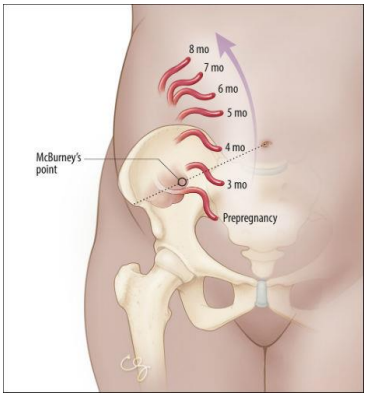
A dose of 50 µg can be used if the patient is at less than 12 weeks of gestation, although many pharmacies carry only the 300-µg dose, which can also be given.

After 12 weeks, a 300-µg dose should be given. The half-life of immune globulin is 24 days, and it needs to be administered within 72 hours of a sensitization event to prevent antibody development.

18) How is appendicitis different in pregnancy? How is it diagnosed?

Major changes during the second half of pregnancy

- Tough to diagnose!
    - Historical features overlap with pregnancy symptoms - anorexia, nausea, vomiting
    - Less abdominal guarding / limited reliable abdominal examination findings
    - Change in appendix location - moves toward the RUQ in the third trimester (although one study found that in 25% of patients it remains in the RLQ)
    - Delay to diagnosis is common (increased complications: sepsis and septic shock, transfusion, pneumonia, bowel obstruction, postoperative infection, and length of stay longer than 3 days.
    - Increase in pregnancy vital signs and laboratory markers (increase WBC, increase ESR)



Diagnosis:

- **Serum markers**
    - *Mild leukocytosis can be a normal finding in pregnant women: the total leukocyte count may be as high as 16,900 cell/microL in the third trimester and 29,000 cells/microL during labor, so leukocytosis may or may not be a sign of appendicitis. - Uptodate*
- **Urine pyuria without bacteriuria**
- **Imaging:**
    - Ultrasound still the recommended first strategy; it can hopefully look for other causes: (ovarian cyst/torsion, nephrolithiasis, cholecystitis)
    - If clinical findings and U/S are inconclusive MRI is the next best test
    - CT is the final option, and may be the only option if no MRI is available
- **Histologic diagnosis!**

Because of confounding factors, the misdiagnosis rate for appendicitis is 30% to 35% overall in pregnancy, with a 40% to 50% rate of removal of normal appendix during the third trimester.

In contrast to the relative safety of performing an exploratory laparotomy or laparoscopy during pregnancy, the risk of fetal loss and maternal morbidity from failure to diagnose appendicitis and perforation is considerable, so clinical vigilance is required, even in the absence of classic signs.

In later pregnancy, when peritoneal signs are often absent and the uterus obscures normal physical findings, diagnosis is frequently delayed, and the perforation rate may approach 25%.

19) List 3 causes of pain in the RUQ in pregnancy. What is the management of each?

- Appendicitis = surgery
- Pyelonephritis / nephrolithiasis = antibiotics / retrieval if needed
- Liver / gallbladder disease = medical vs surgical management
    - Intrahepatic cholestasis of pregnancy
    - Cholecystitis / cholelithiasis
    - Hepatitis
    - Acute fatty liver (hepatic failure usually in 3rd trimester)
    - Spontaneous intrahepatic hemorrhage

20) List 4 safe IV meds and 1 PO medicine used in the management of hyperemesis gravidarum. In what weeks is it most common.

This is not the standard NVP.

Hyperemesis gravidarum (HEG) occurs in approximately 1% of pregnant patients and is defined by nausea and vomiting that cause starvation metabolism (hypokalemia, contraction alkalosis, AG), weight loss greater than 5% of total body weight, dehydration, and prolonged ketonemia and ketonuria.

Most common at the 6-20 week mark.

Management algorithm for treatment of nausea and vomiting of pregnancy (NVP) - great flowchart from Uptodate

Safe PO options: Red = options for hyperemesis gravidarum

- Avoiding dietary triggers
- Ginger 250 mg po QID
- Pyridoxine (vitamin B6) 10-25 mg PO QID
- Diclectin: Doxylamine 10 mg and pyridoxine 10 mg
- Any of the below listed IV agents; if the patient can tolerate PO this would be a safe approach: (most "safe" drug to "least" safe)
    - Dimenhydrinate / diphenhydramine
    - Metoclopramide
    - Ondansetron

Great recent 2017 Cochrane review looking at the efficacy of different drugs for HG: https://www.ncbi.nlm.nih.gov/pubmed?term=28614956

IV options; while giving IV rehydration, electrolytes and thiamine

- (Serotonin antagonist) Ondansetron
    - Unlabeled expert drug of choice for HEG
    - *Available data suggest that use of ondansetron in early pregnancy is not associated with a high risk of congenital malformations, but a small increased risk of cardiovascular malformations, especially septum defects, may exist. A 2016 systematic review including the following studies and two smaller studies came to the same conclusion - Uptodate. Citing PMID 27054939*
- (dopamine antagonist) Metoclopramide, promethazine, prochloroperazine
- (antihistamine H1 antagonists) Dimenhydrinate, meclizine or diphenhydramine [better safety profile for mother and unborn that most other drugs]
- Glucocorticoids

Bottom line = no drug is 100% safe; no one drug is the best; each has its own safety and side effect profile, but they are all widely used and supported

21) Describe the diagnosis and management of PE and DVT in pregnancy

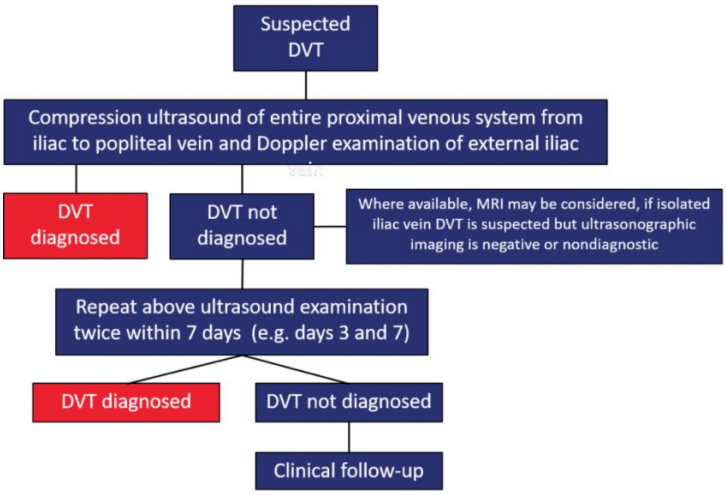
Both are tough to diagnose and manage!

DVT

- Symptoms:
    - Signs and symptoms suggestive of proximal vein thrombosis are diffuse pain and swelling that may or may not be associated with erythema, warmth and tenderness of the lower extremity.
    - Symptoms of iliac vein thrombosis include swelling of the entire leg with or without flank, lower abdomen, buttock, or back pain. - Uptodate
- Dx: order that compression ultrasound of the entire leg
- Bottom line: If any suspicion order that doppler U/S of the entire leg
    - If you have a -ve ultrasound, consider isolated iliac vein thrombosis
    - D-dimer not validated in pregnancy, and is of limited use as a screening test.

Diagnosis of Suspected DVT in Pregnant Women (see Figure 1)

Figure 1: Society of Obstetricians and Gynaecologists of Canada (SOGC) algorithm for investigation of suspected DVT in pregnant patients.*



* *Adapted from Chan et al, 2014.*

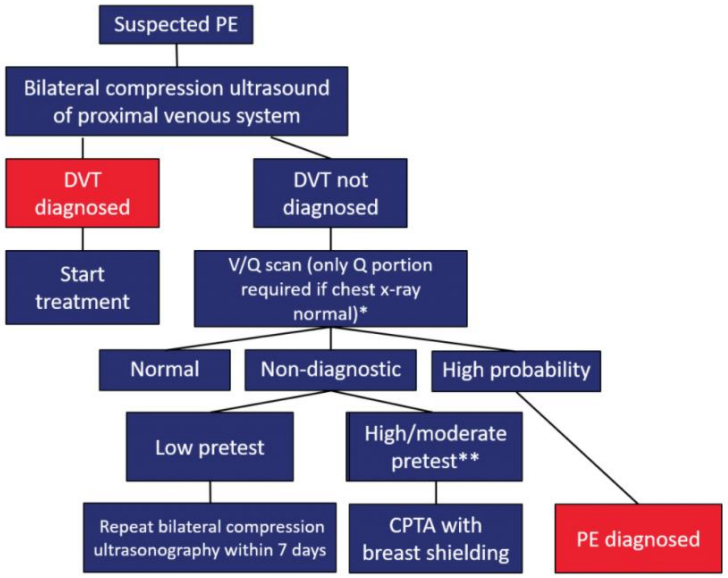
If compression ultrasound is negative, it is prudent to repeat the ultrasound in 3-7 days, but anticoagulation is not necessary.

Copied from: http://thrombosiscanada.ca/clinicalguides/

PE

- Symptoms:
  - Range from mild to severe!
  - Suspect it in cases of acute-onset dyspnea, pleuritic pain, hemoptysis
  - Physician gestalt is inaccurate in pregnancy; dyspnea occurs in 70% of normal pregnancies
- Dx:
  - 1) Examine carefully for signs/symptoms of DVT (if none, probably U/S legs is low yield but some guidelines support its use)
  - 2) Order a CXR first (will help look for other dx, and help guide V/Q vs CTPE)
  - 3) Decision re: CTPE vs. V/Q scan based on availability and patient factors
- Bottom line:
  - Very important to consider it given the high risk of morbidity and mortality
  - No clinical prediction rules or guidelines validated in pregnant women
  - Call a friend
  - Remember a V/Q scan gives you a “probability”; if it is non-diagnostic you’ll have to reconsider your options

Figure 2: Adapted from Society of Obstetricians and Gynaecologists of Canada (SOGC) algorithm for investigation of suspected PE in pregnant patients.*



*If V/Q scan not available, CTPA with PE excluded if normal and PE diagnosed if intraluminal filling defect reported; if nondiagnostic or inadequate, repeat compression ultrasonography at least once within 7 days or V/Q if high pre-test probability

**Repeat compression ultrasonography would also be reasonable in those with a moderate pretest, rather than proceeding to CTPA.

A normal chest x-ray, for which the fetal radiation dose is negligible (<0.1 mGy), is often helpful to rule out other causes of respiratory symptoms. *If compression ultrasound is negative, but clinical suspicion for PE remains, further imaging is necessary. Options include ventilation/perfusion (V/Q) lung scan and computed tomography pulmonary angiography (CTPA).* ***The calculated radiation risk to the fetus with V/Q scan is 0.5 mGy and for CTPA is 0.1 mGy, well below the threshold of 50 mGy associated with increased risk of fetal health problems. However, the calculated minimum radiation dose to each breast for an average 60 kg woman is significantly higher for CTPA*** *(10 to 70 mGy, although that number can be reduced by approximately 20% with the use of bismuth breast shields) than for V/Q scan (<1.5 mGy, depending on technique), raising concerns of increased breast cancer risk in pregnant women exposed to CTPA. Therefore, V/Q scan is the preferred first choice (especially in women with normal chest radiography), if available. Two modifications of the V/Q scan technique further reduce the radiation exposure:*

1. *If the chest x-ray is normal, the ventilation component of the V/Q scan can be omitted and*
2. *Reduction in the number of radioactive particles of the perfusion scan (usually by 50%) and increasing the scan time.*
3.

Highly recommended: Thrombosis Canada App/website.
http://thrombosiscanada.ca/tools/

22) Describe the management of UTI in pregnancy. What are the risks of asymptomatic bacteriuria?

Treatment:

- Asymptomatic bacteriuria
  - 7-10 days of PO antibiotics (exact number of days variable based on the abx)
    - Safe choices; let the culture guide your choice!
      - Cephalosporins (cephalexin)
      - Amoxicillin
      - Nitrofurantoin (avoid during 1st and 3rd trimester)
      - TMP/Sulfa (not during 1st and 3rd trimester)
      - Fosfomycin

See table from UptoDate:

Antibiotics for asymptomatic bacteriuria and cystitis in pregnancy

Antibiotic	Dose	Duration	Notes
Nitrofurantoin	100 mg orally every 12 hours	Five to seven days	Does not achieve therapeutic levels in the kidneys so should not be used if pyelonephritis is suspected. Avoid use during the first trimester and at term if other options are available.
Amoxicillin	500 mg orally every 8 hours or 875 mg orally every 12 hours	Three to seven days	Resistance may limit its utility among gram-negative pathogens.
Amoxicillin-clavulanate	500 mg orally every 8 hours or 875 mg orally every 12 hours	Three to seven days	
Cephalexin	500 mg orally every 6 hours	Three to seven days	
Cefpodoxime	100 mg orally every 12 hours	Three to seven days	
Fosfomycin	3 g orally as single dose		Does not achieve therapeutic levels in the kidneys so should not be used if pyelonephritis is suspected.
Trimethoprim-sulfamethoxazole	800/160 mg (one double strength tablet) every 12 hours	Three days	Avoid during the first trimester and at term.

The durations listed in the table are based on data from studies conducted in both nonpregnant and pregnant women.

Graphic 98083 Version 5.0

- **Bacterial cystitis**
  - Start empiric treatment and wait for the culture results!
  - Choices:
    - Amox-clavulin
    - Nitrofurantoin and Septra (safest in second trimester)
    - Fosfomycin
- **Pyelonephritis**
  - ADMISSION (vs. outpatient parenteral management with close follow-up)
  - IV antibiotics
    - Ceftriaxone
  - Hydration
  - Obstetric consultation

Risks of asymptomatic bacteriuria:

- Screened for routinely at 12-16 weeks
- *predisposes the patient to the development of symptomatic lower and upper tract genitourinary infections (pyelo)*
  - *including maternal sepsis, permanent renal injury, and premature labor.*

Vaginitis, herpes genitalis, chlamydial infection of the urethra, and ovarian torsion can masquerade as urinary tract symptoms. Appendicitis, cholecystitis, pancreatitis, and liver diseases in pregnancy must be considered in the differential diagnosis of an upper urinary tract infection.

Wisecracks

1) What US findings are:

a. Consistent with ectopic pregnancy
b. Suggestive of ectopic pregnancy
c. Consistent with intrauterine pregnancy
d. Indeterminate

	IUP	**Abnormal/ indeterminate***	**Ectopic** **Red = diagnostic** **Yellow = suggestive**
Quant HCG	Usually > 1000-2000 mIU/mL	Usually < 1500 mIU/mL	Any value; < 1000 mIU/mL increases the risk of ectopic pregnancy four fold
Location	**Intrauterine fetal pole**	**Empty uterus** **Non-specific fluid collections** **Echogenic material**	• **Moderate or large cul-de-sac fluid without intrauterine pregnancy** • **Adnexal mass without intrauterine pregnancy** • **Pregnancy in fallopian tube** • **Ectopic fetal pole**
Gestational sac	**Double gest. Sac sign**	**Abnormal sac / pseudo sac** **Single sac**	
Yolk Sac	**Intrauterine**	**Abnormal sac**	
Fetal heart	**Intrauterine fetal heart activity**	**Not found**	**Ectopic fetal heart activity**

2) What are the management options for ectopic pregnancy?

Medical vs. Surgical treatment

Surgical treatment for:

- Surgical abdomen, hemodynamically unstable, suspicion of acute hemoperitoneum
- HCG > 5000 mIU/mL
- TVUS findings show:
  - Ectopic > 3.5 cm
  - Sonographic peritoneal fluid
  - Fetal cardiac activity

- Contraindications to methotrexate therapy
    - Heterotopic pregnancy
    - Breastfeeding
    - **Drug sensitivity**
    - **Comorbidities: heme, renal, hepatic; immunodeficiency, pulmonary disease, peptic ulcer disease**
- **Failed methotrexate therapy**

Medical treatment:

- **Expectant management**
    - **Select few patients:**
        - hCG < 200 and decreasing
        - No suspicious TVUS findings
        - Good close follow-up
        - Patient preference

- **Methotrexate**

    - Hemodynamically stable
    - Have no renal, hepatic, or hematologic disorders
    - Able and willing to comply with post-treatment monitoring and have access to medical care in case of a ruptured fallopian tube
    - Pretreatment serum hCG concentration ≤5000 milli-international units/mL
    - No fetal cardiac activity on transvaginal ultrasound
    - Healthy (comorbid illness e.g. immunodeficiency)
    - Patient preference for methotrexate over sugery

3) List types of gestational trophoblastic disease.

Lesions that arise from abnormal fetal trophoblastic proliferation.

Non-neoplastic and neoplastic.

The list from Uptodate:

Benign nonneoplastic trophoblastic lesions — These lesions are frequently diagnosed only as an incidental finding on an endometrial curettage or hysterectomy specimen.

- *Exaggerated placental site*

- *Placental site nodule*

Hydatidiform mole — *Hydatidiform moles result from abnormalities in fertilization. They are essentially benign, but carry an increased risk of persistent or malignant GTN.*

- *Complete hydatidiform mole*

- *Partial hydatidiform mole*

- *Invasive mole (chorioadenoma destruens)*

Gestational trophoblastic neoplasia (GTN) — *True GTN comprises a group of tumors with the potential for local invasion and metastases. In contrast to other more common malignancies, GTN is curable in 85 to 100 percent of cases, even in the presence of advanced disease.*

- ***Choriocarcinoma***
- ***Placental site trophoblastic tumor***
- ***Epithelioid trophoblastic tumor***

4) What is vasa previa?

In vasa previa, fetal blood vessels are present in the membranes covering the internal cervical os. The membranous vessels may be associated with a velamentous umbilical cord (type 1 vasa previa) or they may connect the lobes of a bilobed placenta or the placenta and a succenturiate lobe (type 2 vasa previa).

Aberrant blood vessels within 2 cm of the internal os have similar implications to those actually covering the internal os. -Uptodate 2018

5) Which life threatening causes of headache have altered risk in pregnancy?

The prothrombotic state is maximal the period of delivery and postpartum 6 weeks.

- Higher risk of:
  - Cerebral venous thrombosis
  - Intracranial neoplasm
  - Intracranial hemorrhage
  - Stroke
    - Hemorrhagic from aneurysms, AVM, eclampsia
    - Ischemic from CVT, eclampsia, cardioembolism
  - Preeclampsia to eclampsia spectrum
    - Remember:
      - > 20 weeks gestation
      - BP > 140/90 on two occasions four hours apart
      - Any of the following:
        - Proteinuria
          - > 1+ dipstick
          - ≥0.3 g in a 24-hour urine specimen or protein/creatinine ratio ≥0.3 (mg/mg)(30 mg/mmol)
        - Serum creatinine >97.2 micromol/L or doubling of the creatinine concentration in the absence of other renal disease
        - Liver transaminases at least twice the upper limit of the normal concentrations

- Pulmonary edema
- Cerebral or visual symptoms (eg, new-onset and persistent headaches not responding to usual doses of analgesics*; blurred vision, flashing lights or sparks, scotomata)

6) Why are pregnant patients at increased risk of VTE?

They have the trifecta of virchow!

Pregnancy is a hypercoagulable state, with increased coagulation factors and stasis as pregnancy progresses and significant vascular trauma at the time of delivery.

The risk of venous thrombosis increases during pregnancy to five or six times that of nonpregnant women. Although the risk is increased throughout pregnancy, it is highest during the puerperium.

Risk factors include smoking, obesity, age older than 35 years, hypercoagulable state, varicose veins, and prior superficial venous thrombosis. Women who deliver prematurely or have postpartum hemorrhage are also at higher risk.

7) List the risk factors for peripartum cardiomyopathy. During which time period do these patients present.

Highest risk time: *PPCM is rarely seen before 36 weeks of gestation, and affected patients usually present during the first month postpartum. - UTD*

Incidence in Canada: 1:2400
Exact etiology is unknown.

RF:

- Age >30
- African descent
- Pregnancy with >1 fetus
- Hx of preeclampsia, eclampsia, postpartum hypertension
- Maternal cocaine use
- Long term oral tocolytic therapy with beta adrenergic agonists

8) How are BV, vaginal yeast infections and trichomonas infections managed during pregnancy?

BV:

- *BV associated with morbidity - so treat!*
- *7-day course of metronidazole or 7-day course of clindamycin. Intravaginal treatment is not recommended in pregnant patients.*

Vaginal yeast infections:

- *There is no association of Candida colonization with adverse pregnancy outcomes, and treatment is for relief of symptoms only.*
- *Oral azoles are contraindicated in pregnancy because of an association with adverse fetal outcomes.*
- *Treatment with vaginal azoles for 7 days during pregnancy is considered safe, with an estimated 85% to 100% cure rate.*

Trichomonas:

- *Symptomatic treatment usually deferred until > 37 weeks gestation*
- *metronidazole, a one-time dose of 2 g, for symptomatic patients only.*

9) List the foetal complications of n. gonorrhea and c. trachomatis.

Sexually transmitted diseases are treated in pregnant patients according to the latest CDC guidelines. In general, the tetracyclines and quinolones are contraindicated in pregnant patients. Treatment of genital tract infections may be important in preventing preterm labor and decreasing transmission to the infant.

Complications:

- Salpingitis in pregnancy
- Disseminated gonorrhea in pregnancy
- Gonococcal arthritis
- Preterm labour
- Postpartum endometritis
- Infant:
    - Conjunctivitis
    - Pneumonitis
    - Neonatal gonococcal ophthalmia
    - Sepsis

Chlamydia:

- *Treatment during pregnancy or breast-feeding is azithromycin (single 1-g dose), which improves compliance and decreases gastrointestinal side effects; a 7-day course of amoxicillin is an acceptable alternative.*

10) What is chorioamnionitis? What organisms are pathogenic? How is it treated? What are the risk factors?

- Chorioamnionitis is the infection or inflammation of the placenta and fetal membranes.
- After 16 weeks of pregnancy, the chorioamniotic membranes adhere to the cervical os and may become infected.
- Chorioamnionitis is diagnosed by the findings of fever, maternal and fetal tachycardia, and uterine tenderness in a patient past 16 weeks of pregnancy.
- Vaginal and cervical culture specimens for group B streptococci, E. coli, chlamydia, and gonorrhea should also be obtained.
- Urgent obstetric consultation should be obtained, and hospitalization for IV administration of antibiotics is required. Patients are usually treated with IV ampicillin and gentamicin.

RF:

- Women with preterm labour
- Multiple digital exams
- Cervical insufficiency
- Nulliparity
- Genital tract pathogens
- ETOH or tobacco use
- Longer ruptured membranes

11) List GI complications of pregnancy.

- **Oropharynx**
  - Gingivitis, teeth decay and cavities
  - Pyogenic granuloma of pregnancy

- **Stomach:**
  - GERD
  - Gastric aspiration
  - Nausea and vomiting of pregnancy; hyperemesis gravidarum

- **Liver:**
  - Hyperemesis gravidarum
  - Acute fatty liver disease of pregnancy
  - Intrahepatic cholestasis of pregnancy; Cholecystitis
  - HELLP

- **Intestines**
  - Bloating and constipation
  - Incontinence and flatus
  - Hemorrhoids

- **Postpartum pain**
  - **Think broad!**
    - **Uterine**
      - Uterine rupture
      - Retained products
      - Endometritis
      - Fibroid degeneration
    - **Non-uterine pregnancy related**
      - Preeclampsia with liver distension
      - Acute fatty liver
      - Breastfeeding uterine contractions
    - **Non-pregnancy**
      - **Anything as in a regular adult!**
        - GI
        - Ovarian
        - Renal / GU
        - Vascular
        - Splenic rupture