Urologic Emergencies in Pregnancy

Paul Gustafson, PGY-5
October 1st, 2014

Objectives

- Review physiologic and anatomic changes of the GU tract associated with pregnancy
- Review the incidence and natural history of urolithiasis in the pregnant patient
- Review the indications for non-surgical and surgical management of stones during pregnancy
Objectives

- Review the clinical implications of UTIs and asymptomatic bacteruria during pregnancy
- Review current treatment guidelines for bacteruria during pregnancy

Objectives

- Review management of placenta percreta, hematuria and urinary retention in the pregnant patient
- Review management of urologic malignancies in pregnancy:
  - Pheochromocytoma
  - AML
Case

- 37 year old female, 34 weeks pregnant
- Assessed at BC Women’s Hospital with fever and left flank pain
- PMHX: nil
- ANHx: nil
- Meds: nil
- All: NKDA

Case: Ultrasound

⇒ Mild, left-sided hydronephrosis
Case

- Urology consult: ? stone
- Recommend treat as pyelonephritis with IV antibiotics
- Clinically deteriorated later that night, transferred to SPH with sepsis

Case

- Sepsis resolved, transferred back to BC Women’s hospital
- Repeat U/S:

![Ultrasound Image]

- Ongoing left-flank pain requiring IV Morphine
Case

→ Left proximal ureteric calculus

Case

- Transferred back to SPH for ureteroscopy
- Uncomplicated laser lithotripsy
  - no fluoro time
  - stent with dangle string
Anatomic and Physiologic Changes with Pregnancy - Cardiovascular System

Anatomic and Physiologic Changes with Pregnancy - Upper Tracts

**Physiologic Hydronephrosis:**

- Occurs by 7th week of gestation in 90% of pregnancies
- May persist 6 weeks post-partum
- Hormonal and mechanical factors
  - expanding uterus compresses ureters against pelvic brim
  - circulating progesterone inhibits ureteral smooth muscle contraction
Anatomic and Physiologic Changes with Pregnancy - Upper tracts

Physiologic Hydronephrosis:
- Right > Left
  - dextrorotation of uterus
  - left protected by sigmoid colon
- May be painful, requiring:
  - analgesia
  - positioning patient left side down
  - stenting
  - nephrostomy tube placement

Anatomic and Physiologic Changes with Pregnancy - Upper Tracts

- With increased CO and decreased SVR, concomitant increase in Renal Plasma Flow (50-85%) and GFR (40-65%)
- Serum creatinine levels lower (25%)
- Elevated filtered loads of:
  - Sodium
  - Uric acid
  - Calcium
  - Citrate
  - Magnesium
  - Glycoproteins
Anatomic and Physiologic Changes with Pregnancy - Lower Tracts

- Bladder displaced anteriorly with lateral expansion, indentation of dome by expanding uterus
- Increased circulating estrogen and progesterone induce hyperemia and congestion of bladder and urethral mucosa
- Increased incontinence:
  - Decreased contractile response of bladder neck to alpha-adrenergic stimulation
  - Decreased pelvic support of anterior vaginal wall and urethra

"When it comes to bustin' a kidney stone, the old methods are still the best."
# Urolithiasis - Incidence

## Lithogenic factors:
- Hypercalcuria
- Hyperuricosuria
- ↑urinary Na
- Hyperoxaluria
- Urinary stasis

## Protective factors:
- Hypercitraturation
- Hypermagnesuria
- ↑glycosaminoglycans
- ↑urinary volume

## Incidence:
- Equivalent to incidence in non-pregnant women of child-bearing age
- Symptomatic nephrolithisis 1/1500
- Same on left and right
- 2 x greater in ureter than kidney
- Most in 2nd and 3rd trimester
Urolithiasis - Stone composition

Retrospective review of 27 pregnant patients with de novo stone formation undergoing ureteroscopy:

- 74% calcium phosphate
- 24% calcium oxalate

Urolithiasis - Presentation

Symptoms:

- Nausea and vomiting
- Hematuria (15% gross, 75% microscopic)
- Flank/abdominal pain
  - Localization and radiation may be altered
  - Difficult to differentiate from physiological hydronephrosis
  - 28% initially misdiagnosed as appendicitis, diverticulitis, placental abruption
Urolithiasis - Obstetrical Complications

Renal colic from ureteral obstruction associated with:

- Hypertension
- Pre-eclampsia
- Premature labour

Urolithiasis - Imaging

Risk of ionizing radiation to developing fetus:

- Prenatal death
- IUGR
- Microcephaly
- Mental retardation
- Organ malformation
- Childhood cancer
Urolithiasis - Imaging

- Depends on gestational age and radiation dose
- Most harmful in first trimester during organogenesis
- ACOG 2004: “exposure to < 50mGy (5 rad) has not been associated with an increase in fetal anomalies or pregnancy loss”

### Fetal Effects from Low-Level Radiation Exposure

<table>
<thead>
<tr>
<th>Effect</th>
<th>Most Effective Period after Conception (d)</th>
<th>Animal Studies</th>
<th>Human Studies</th>
<th>Absolute Incidence</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paternal death</td>
<td>0-5</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
<td>If the conceptus survives, it is thought to develop fully, with no radiation damage.</td>
</tr>
<tr>
<td>Premature birth before 28 weeks</td>
<td>5-14</td>
<td>70</td>
<td>200</td>
<td>ND</td>
<td>Anatomically mature, liveborn but with minor external and internal defects.</td>
</tr>
<tr>
<td>Organ malformations</td>
<td>14-56</td>
<td>250</td>
<td>250</td>
<td>ND</td>
<td>None. About 15% of children with cardiac malformations were born to exposed women. The outcome was observed for exposure in the first 5 weeks or after the 25th week.</td>
</tr>
<tr>
<td>Serum neutralization</td>
<td>56-145</td>
<td>100</td>
<td>100</td>
<td>0.006%±</td>
<td>Note: Fetal effect was observed for exposure in the first 5 weeks or after the 25th week.</td>
</tr>
<tr>
<td>Reduction of IQ</td>
<td>56-145</td>
<td>NED</td>
<td>100</td>
<td>ND</td>
<td>None. The IQ reduction was observed for exposure in the first 5 weeks or after the 25th week.</td>
</tr>
<tr>
<td>Childhood cancer</td>
<td>0-7 (diploidy)</td>
<td>No threshold observed</td>
<td>No threshold observed</td>
<td>0.017%±</td>
<td>None. Results from 380 children born to exposed mothers.</td>
</tr>
</tbody>
</table>

Note: 1. Radiation dose values are in mGy (rad) for the exposed mothers.
Fetal Radiation Dose - X-Ray and Fluoroscopy

**Estimated Conceptus Doses from Radiographic and Fluoroscopic Examinations**

<table>
<thead>
<tr>
<th>Examination</th>
<th>Typical Conceptus Dose (mGy)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cervical spine (AP, lat)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Extremities</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Chest (PA, lat)</td>
<td>0.002</td>
</tr>
<tr>
<td>Fluoroscopic (AP/lat)</td>
<td>0.002</td>
</tr>
<tr>
<td>Abdomen (AP)</td>
<td></td>
</tr>
<tr>
<td>21-cm patient thickness</td>
<td>1</td>
</tr>
<tr>
<td>33-cm patient thickness</td>
<td>3</td>
</tr>
<tr>
<td>Lumbar spine (AP, lat)</td>
<td>1</td>
</tr>
<tr>
<td>Limited IVP</td>
<td>6</td>
</tr>
<tr>
<td>Small-bowel study^1</td>
<td>7</td>
</tr>
<tr>
<td>Double-contrast barium</td>
<td></td>
</tr>
<tr>
<td>enema study^2</td>
<td>7</td>
</tr>
</tbody>
</table>

**Limited IVP**

- “3-shot IVP”: scout, 30s, 20 min films adequate (Dr. Stothers et al.)
- Superior visualization of ureters compared to U/S
- Less radiation than CT
- Contrast crosses placenta
  - not demonstrated to have teratogenic effects
  - may depress fetal thyroid function
Computerized Tomography

Table 4
Estimated Conceptus Doses from Single CT Acquisition

<table>
<thead>
<tr>
<th>Examination</th>
<th>Dose Level</th>
<th>Typical Conceptus Dose (mGy)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extra-abdominal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Head CT</td>
<td>Standard</td>
<td>0</td>
</tr>
<tr>
<td>Chest CT</td>
<td>Standard</td>
<td>0.2</td>
</tr>
<tr>
<td>Routine</td>
<td>Standard</td>
<td>0.2</td>
</tr>
<tr>
<td>Pulmonary embolus</td>
<td>Standard</td>
<td>0.2</td>
</tr>
<tr>
<td>CT angiography of coronary arteries</td>
<td>Standard</td>
<td>0.1</td>
</tr>
<tr>
<td>Abdominal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abdomen/pelvis, routine</td>
<td>Standard</td>
<td>25</td>
</tr>
<tr>
<td>CT angiography of lower ileum</td>
<td>Standard</td>
<td>24</td>
</tr>
<tr>
<td>Abdomen/pelvis</td>
<td>Reduced</td>
<td>10</td>
</tr>
</tbody>
</table>

*Anatomic coverage is the same as for routine abdominopelvic CT, but the tube current is decreased and the pitch is increased because standard image quality is not necessary for detection of high-contrast stones.

Low Dose CT

- Prospective, randomized study of distal ureteric calculi of stones 3-7mm in size
- No significant difference in sensitivity or specificity at any level of radiation
- Excellent inter-observer agreement
- All false negatives with 3 mm calculi
Low Dose CT

- Study of 20 pregnant patients
- Mean dose 7.1 mGy (limited IVP 6-20 mGy)
- Less than threshold for fetal harm (50 mGy)
- Conclusion: useful in pregnant patients when U/S non-diagnostic

Ultra-Low Dose CT

- ULDCT protocol (avg 0.28 mSv) not in clinical use at VGH
- U/S and MR considered first and second line exams for suspected renal colic in the pregnant patient
Radiation Exposure - Conclusions

- Radiation dose less than 50 mGy (5 rad) poses negligible risk of pregnancy loss or fetal anomalies
- Risks of exposure may be outweighed by important diagnostic studies
- Will the study change management?

Ultrasound

**Advantages**
- Preferred first-line imaging for stones
- No risk to fetus
- Visualization of parenchyma and identification of hydronephrosis

**Disadvantages**
- Limited by physiological hydronephrosis
- Difficulty visualizing ureters
- Limited sensitivity identifying stones in pregnant women (38-95%)

Renal Colic in Pregnancy: Lithiasis or Physiological Hydronephrosis?

*Matul Arora and Ren MacMahon*
Ultrasound

Diagnostic Accuracy improved with:
- Colour Doppler for ureteral jets
- Transvaginal U/S
- Renal Resistive Index

Ultrasound

Renal Colic in Pregnancy:
Lithiasis or Physiological Hydronephrosis?
Matel Andreoli and Ross MacMahon

- 2009 study of 262 pregnant patients with renal colic
- 144 ultimately documented to have stone
- 56% identified by ultrasound
- Accuracy improved to 72% with presence of:
  - hydroureter below pelvic brim
  - asymmetric absence of ureteral jet
  - elevated resistive index
Ultrasound – Resistive Index

RENAL COLIC IN PREGNANT WOMEN: ROLE OF RENAL RESISTIVE INDEX
AHMED A. SHOEIR, MOHAMED R. MAHRAN, AND MAGDY ABDULMAABoud

- 22 pregnant patients with obstructing calculi confirmed with limited IVP
- ΔRI calculated (= RI_{ipsilateral} – RI_{contralateral})
- ΔRI of these patients compared to ΔRI of 71 pregnant patients without stones and 20 non-pregnant women of childbearing age
- ΔRI significantly different in patients with stones (0.06 vs 0.006)

Transvaginal Ultrasound

Distal ureteral calculi: detection with vaginal US.
Laing FC\textsuperscript{1}, Benson CB, DiSalvo DN, Brown DL, Frates MC, Loughlin KR.

- May better visualize distal ureter
- Small study of 13 patients with renal colic:
  - 13/13 distal ureteral stones identified with transvaginal U/S vs.
  - 2/13 with transabdominal U/S
  - 6/13 pregnant
MRI Urography

Advantages:

- Safe – no radiation, no contrast

Disadvantages:

- Stones (calcium) poorly visualized
  - seen as filling defects amongst high-intensity signal of urine
- Limited Access

MR Urography

- T2-weighted MR Urogram of 24 patients with symptomatic hydronephrosis
- 7 patients with stones had distinct pattern c/w patients with physiologic hydronephrosis:
  - “double kink sign”
  - intraluminal filling defect
  - peri-renal fluid
  - renal edema
  - standing column of urine in pelvic ureter
Urolithiasis - Management

- Consider stone size location and gestational age of fetus
- Stothers et al.:
  - 64-70% passed spontaneously during pregnancy
  - 50% of remaining patients passed stones post-partum
- Intervention required in 1/3 of patients

Urolithiasis - Management

**Conservative therapy:**
- Opioids first line analgesia
- NSAIDs contraindicated d/t risk of 1st TM spontaneous abortion, premature closure of ductus arteriosus, fetal pHTN, fetal renal anomalies
- Admission for IV hydration +/- fetal monitoring
FDA Fetal Risk Drug Categories

- **A:** No fetal risk; proven safe for using during pregnancy with well-controlled studies
- **B:** Animal studies have shown no risk to fetus and there are no adequate well-controlled studies in pregnant women
- **C:** Animal studies have shown an adverse effect on the fetus and there are no well-controlled studies in humans, but potential benefits may warrant use of the drug in pregnant women despite potential risks
- **D:** Some evidence of fetal risk; may be necessary to use this drug
- **X:** Proven fetal risk: contraindicated for use in pregnancy

Urolithiasis - Management

**Medical expulsive therapy:**
- Tamsulosin, Calcium channel blockers have been shown to facilitate stone passage
- CCBs FDA category C
- Tamsulosin FDA category B
Urolithiasis- Management

- 1/3 of patients will require intervention
- Indications:
  - Intractable pain, nausea/vomiting
  - Febrile urinary tract infection/sepsis
  - Acute renal failure
  - Obstruction of solitary kidney
  - Obstetric complications (preeclampsia)

Urolithiasis - Management

- Management Options:
  - Ureteral stent
  - Percutaneous nephrostomy
  - Ureteroscopy
- ESWL contraindicated
  - Shock waves considered detrimental to fetus
  - Placental separation, bleeding
- PNL not recommended
  - Extended fluoroscopy, patient positioning
Urolithiasis - Management

Ureteral Stent

- Under local with U/S guidance or under GA with limited fluoroscopy
- Complications:
  - Worsen irritative LUTS
  - Stent encrustation
  - Bacterial colonization

Percutaneous Nephrostomy

- Under local with U/S guidance
- Complications:
  - Bleeding
  - External appliance
  - Bacterial colonization
  - Encrustation (easier to change/irrigate)
Urolithiasis - Management

Ureteroscopy

- Safe, effective in any trimester
- Stone free rates 70-100%
- Meta-analysis of 14 studies (108 pts)
  “When compared to the multinational meta-analysis of ureteroscopy in nonpregnant women, there was no significant difference in the ureteral injury and urinary tract infection complication rates”

<table>
<thead>
<tr>
<th>Literature</th>
<th>Patients (N)</th>
<th>Complications N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semins et al74</td>
<td>108</td>
<td>9 (8.3) – ureteral perforation (1), premature contractions (1), postoperative pain (2), UTI (5)</td>
</tr>
<tr>
<td>Meta-analysis</td>
<td>14 studies</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Devassy et al77</td>
<td>19</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Polat et al75</td>
<td>8</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Ross et al28</td>
<td>21</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Bozkurt et al78</td>
<td>41</td>
<td>15 (36) – ureteral injury (4), sepsis (1), UTI (5), pain (6)</td>
</tr>
<tr>
<td>Johnson et al79</td>
<td>46</td>
<td>2 (4) – preterm labor (1), preterm delivery (2)</td>
</tr>
<tr>
<td>Iloscan et al80</td>
<td>34</td>
<td>12 (35) – uterine contraction (1), UTI (3), other minor (8)</td>
</tr>
</tbody>
</table>
Urinary Tract Infections

- Incidence not increased (4-7%)
- Asymptomatic bacteruria
- Acute cystitis
- Acute pyelonephritis
  - higher risk c/w non-pregnant patients
    (20-40% vs. 1-4% following bacteruria)
Asymptomatic Bacteruria

- Screening standard of care starting in first trimester
- Definition: > $10^5$ CFU/mL
- Risk factors: advanced gestational age, low SES, multiparity, sickle cell trait, hx of recurrent UTIs, DM, anatomic abnormalities
- Early treatment decreases prevalence of acute pyelonephritis from 28% to less than 3%

Asymptomatic Bacteruria - Treatment

**Cochrane review (14 studies, 2302 patients)**

- Antibiotics effective c/w placebo/no treatment (RR 0.25)
- Reduced incidence of pyelonephritis (RR 0.23)
- Reduced incidence of low birth weight (RR 0.66)
- No consensus on duration or choice of antibiotics
Asymptomatic Bacteruria - Treatment

- Single dose efficacy: 50-80%
- 3-day course efficacy: 70-80%
- Follow-up culture recommended to ensure adequate treatment and to r/o recurrent/persistent infections

Acute Cystitis

- 1-2% of pregnant women
- Symptoms: frequency, urgency, dysuria, hematuria
- Progression from asymptomatic bacteruria to symptomatic infection 3-4 times greater in pregnancy d/t:
  - Compression of enlarged uterus
  - Hypoperistalsis
  - Relative state of immunosuppression
- Microbiology similar to non-pregnant patients:
  - E. coli most common
  - Klebsiella, proteus, S. saprophyticus, GBS
Acute Pyelonephritis

- 1-4% of pregnant women
- 20-40% of women with untreated asymptomatic bacteruria
- 60-75% occur in third trimester
  - hydrenephrosis and urinary stasis most pronounced
- Symptoms: fever, chills, nausea, vomiting, CVA tenderness

Maternal complications:
- Anemia
- Hypertension
- Acute renal failure
- Sepsis
- ARDS

Fetal complications:
- Pre-mature labour
- Low birth weight
- Fetal mortality
Acute Pyelonephritis - Treatment

- Admission to hospital, parental antibiotics initially
- 95% of patients respond within 24 hours using ampicillin + gentamycin or cephalosporin
- 10-14 day course of oral antibiotics after defervescence
- Low-dose prophylaxis or monthly urine culture until delivery

FDA Fetal Risk Drug Categories

- A: No fetal risk; proven safe for using during pregnancy with well-controlled studies
- B: Animal studies have shown no risk to fetus and there are no adequate well-controlled studies in pregnant women
- C: Animal studies have shown an adverse effect on the fetus and there are no well-controlled studies in humans, but potential benefits may warrant use of the drug in pregnant women despite potential risks
- D: Some evidence of fetal risk; may be necessary to use this drug
- X: Proven fetal risk: contraindicated for use in pregnancy
### Table 3. Antibiotic use during pregnancy

<table>
<thead>
<tr>
<th>Drug in Pregnancy</th>
<th>Toxicity</th>
<th>Clinical Importance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrofurantoin</td>
<td>Theoretical risk of renal anemia in the 3rd trimester in G6PD deficiency mothers</td>
<td>May be considered for UTI prophylaxis. Lacks sufficient tissue penetration to treat acute pyelonephritis.</td>
</tr>
<tr>
<td>Aminoglycosides</td>
<td>Theoretical risk of ototoxicity or neurotoxicity</td>
<td>Often used with ampicillin to treat acute pyelonephritis. Achieves high renal tissue concentrations.</td>
</tr>
<tr>
<td>Sulfonamides</td>
<td>Theoretical increased risk of neural tube defects due to its antifolate metabolism in the 1st trimester</td>
<td>High incidence of F. coli resistance.</td>
</tr>
<tr>
<td>Trimethoprim</td>
<td>Theoretical increased risk of neural tube defects because of its antifolate metabolism in the 1st trimester</td>
<td>Increasing F. coli resistance.</td>
</tr>
</tbody>
</table>

### Acute Urinary Retention

- **Incidence 1/3000 to 1/8000**
- **Typically occurs 12-14 weeks gestation**
- **Resolved at 16 weeks when uterus grows out of the pelvis**
- **Enlargement of retroverted uterus with entrapment of fundus below sacral promontory**
- **Patients with fibroids may be predisposed**
Acute Urinary Retention - Management

- Temporary foley
- Clean intermittent catheterization
- Bimanual manipulation of uterus to anteverted position
- Temporary pessary to maintain uterine anteversion

Hematuria

- Differentiate from vaginal bleeding
- Infection, urolithiasis, malignancy, renal disease must be ruled out
- Microscopic hematuria (>3 RBCs/HPF) may be considered idiopathic
  - physiologic renal changes
  - “nutcracker theory”
  - evaluation completed after delivery if persistent
- U/S (or MRI), cystoscopy for gross hematuria
- Placenta percreta – 22% present with GH
Placenta Percreta

- Invasion of placenta through uterus into the bladder
- Life-threatening risk of significant hemorrhage
- Incidence of abnormal placentation
  1/7000 deliveries
  - placenta percreta 5-7%

Placenta Percreta - Diagnosis

- Often discovered late
- May be found on ultrasound
- May be suggested by elevated maternal AFP in absence of fetal anomalies
- 22% present with gross hematuria
- May be identified on cystoscopy (posterior bladder wall)
- Avoid biopsy d/t risk of significant hemorrhage
Placenta Percreta - management

- Separation of placenta not advised – risk of significant hemorrhage
- Hysterectomy with partial cystectomy immediately following delivery
- Conservative management with methotrexate, delayed hysterectomy, and bladder preservation in select patients

Urological Neoplasms

- Pheochromocytoma and renal AML may present as urological emergencies during pregnancy
- Potential for maternal or fetal morbidity and mortality
Angiomyolipoma

- Second most common renal mass identified during pregnancy (1st RCC)
- Female predominance of AML
- May present with:
  - Flank pain
  - Hematuria
  - Hemorrhagic shock

Angiomyolipoma

- Massive hemorrhage during pregnancy most worrisome complication
  - Rapid growth during pregnancy
  - Increased abdominal pressure and circulating blood volume may increase the risk of rupture
- Surgery recommended before pregnancy for masses > 4cm d/t increased risk of rupture and bleeding
## Angiomyolipoma

### Diagnosis
- Diagnosis confirmed with U/S or MRI – can avoid ionizing radiation
- Angiography diagnostic and therapeutic in select patients

### Management
- Observation (If asymptomatic, hemodynamically stable)
- Open or laparoscopic surgery
- Thermal ablation
- Embolization (can be done with minimal radiation exposure and contrast)

## Surgical Management - Anesthesia

- 5405 cases of non-obstetric surgeries during pregnancy
  - Increased incidence of prematurity and low birth weight
  - d/t underlying disease rather than anesthesia
  - No increase in fetal anomalies
- Safest time is 2nd trimester
- 1st trimester risk of spontaneous abortion
- 3rd trimester risk of pre-term labour
Pheochromocytoma

- 1/50,000 diagnosed during pregnancy
- Rare, but potential for significant morbidity
- May present with:
  - Hypertension
  - Headaches
  - Palpitations
  - Flushing
- Distinct from pre-eclampsia:
  - Earlier hypertension
  - No proteinuria

Pheochromocytoma - Diagnosis

- U/S or MRI for tumour location
- Bright on T2 MRI
- CT and MIBG avoided
- 24-hour urine metanephrines
Pheochromocytoma - Management

- Early in pregnancy: Elective termination of pregnancy may be offered
- Late in pregnancy: Delivery in third trimester after fetal lung development
  - C/S has lower maternal mortality rate than vaginal delivery
- Laparoscopic or open adrenalectomy with pre-operative alpha blockade (phenoxybenzamine FDA category C)
- Surgery may be concomitant with C/S to avoid 2 anesthetics

Conclusions - Urolithiasis

- Incidence of Urolithiasis similar to non-pregnant patients
- U/S first line imaging modality
- Majority of patients can be managed conservatively
- Ureteroscopy safe and effective
Conclusions - UTIs

- Overall incidence similar to non-pregnant patients
- Greater risk of pyelonephritis
- Untreated asymptomatic bacteruria risk factor for pyelonephritis
- Screening recommended starting in 1st TM
- Local resistance patterns guide appropriate therapy with antibiotics safe for both mother and fetus

Conclusions

- Normal physiologic and anatomic changes may obscure diagnostic signs
- Placenta percreta worrisome cause of hematuria – usually requires hysterectomy and partial cystectomy
- Acute urinary retention rare
Conclusions – Urological Neoplasms

- Pheo and AML rare, but may pose emergencies during pregnancy with potential for maternal or fetal morbidity and mortality.
- Timing of surgical intervention individualized depending on clinical status and gestational age.

Thanks

- Dr. Afshar
Questions?