POST-PARTUM COMPLICATIONS: INFECTIONS

Background

1. Definition
   - Infections occurring from delivery of a newborn to several weeks postpartum
     - Related to the reproductive tract
   - Most occur within five days following delivery
     - Remainder usually manifest within 21 days

2. General information
   - Infections can occur at several sites:
     - Endometritis:
       - Infection of the decidua
       - With possible extension into:
         - Myometrium
         - Parametrium
     - Surgical site infection:
       - C-section incision
       - Episiotomy
     - Pelvic abscess:
       - Intra-abdominal
         - Usually following C-section
     - Septic pelvic thrombophlebitis
     - Mastitis and breast abscess

Pathophysiology

1. Pathology of disease
   - Endometritis:
     - Vaginal organisms invade the endometrial cavity
       - Usually polymicrobial (70%):
         - Gram positives
         - Gram negatives
         - Anaerobes
         - Mycoplasma
         - Ureaplasma
         - Chlamydia
       - Rare but potentially lethal causes (toxic-shock syndromes):
         - Clostridium sordellii
         - Staphylococcus aureus
   - Surgical site infection:
     - Contamination of incision site from vaginal or skin organisms
     - Early wound infections
       - First 24 to 48 hours
       - Usually due to group A or B beta-hemolytic streptococcus
     - Later infection can be due to:
       - Staphylococcus epidermidis
       - S. aureus
       - E. coli
       - Proteus
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- Vaginal flora
  - Pelvic abscess:
    - Coliforms and anaerobic gram-negative bacilli
    - Particularly Bacteroides and Prevotella species
  - Septic pelvic thrombophlebitis:
    - Microthrombosis of blood vessels in pelvis
    - Usually in setting of pelvic infection
    - Subsequent showers of small septic emboli

2. Incidence, prevalence
  - Endometritis:
    - <3% following vaginal delivery
    - 15-30% following C-section
    - Antibiotic prophylaxis reduces risk by about 60%
  - Surgical site infection:
    - 2.5-16% following C-section
  - Pelvic abscess:
    - Uncommon
    - <1% of those with endometritis
  - Septic pelvic thrombophlebitis:
    - 0.18%
    - 87% of these are in setting of C-section delivery

3. Risk factors
  - Endometritis:
    - Operative delivery
      - Particularly C-section, higher if non-elective surgery
    - Instrumented vaginal delivery
    - Multiple vaginal examinations prior to delivery
    - Prolonged rupture of membranes
    - Manual removal of placenta
  - Surgical site infection and pelvic abscess:
    - Preexisting infection
      - Such as chorioamnionitis
      - Obesity
      - Immune-compromised conditions such as diabetes mellitus, HIV disease, or corticosteroid therapy
  - Septic pelvic thrombophlebitis:
    - Presence of endometritis

4. Morbidity/ mortality
  - Very low morbidity or mortality for these conditions
    - If recognized promptly and treated
  - Surgical site infection:
    - Increased morbidity and mortality
    - With infection extending beyond fascial layer and wound dehiscence
  - Septic pelvic thrombophlebitis:
    - Mortality rate of 18 per 1,000,000 pregnancies
    - When death occurs
      - Widespread and overwhelming infection
      - Septic emboli is almost always the cause
Diagnostics

1. History
   - Fever
   - Chills
   - Malaise
   - Endometritis:
     - Pelvic or abdominal pain
     - Abnormal vaginal bleeding
   - Surgical site infection:
     - Localized erythema
     - Induration
     - Heat
     - Pain at the incision site
     - Eventually purulent wound drainage and separation may occur
   - Pelvic abscess:
     - Lower abdominal pain
   - Septic pelvic thrombophlebitis:
     - Spiking fevers despite antibiotic treatment
     - Patient often feeling entirely well in between spikes
     - Pain is notably absent

2. Physical examination
   - Temperature >100.4 F or 38 C
     - Note: a single fever spike within the first 24 hours after delivery may be benign; evaluate risk factors and other symptoms before starting antibiotics (Ely, Dawson, Townsend, Rijhsinghani, & Bowdler, 1996)
   - Tachycardia
   - Endometritis:
     - Abdominal and uterine tenderness
     - Foul-smelling lochia
   - Surgical site infection:
     - Red wound
     - Tender
     - May have purulent drainage
   - Pelvic abscess:
     - Tender pelvic mass adjacent to uterus
   - Septic pelvic thrombophlebitis:
     - Evidence of endometritis

3. Diagnostic testing
   - Endometritis:
     - Laboratory:
       - WBC count:
         - Elevated and rising
         - Modest elevations can be normal
       - Blood cultures:
         - Bacteremia present in 10-20% of endometritis
         - Endometrial cultures are NOT indicated
         - May be considered to look for unusual organisms
         - When failure to respond to usual therapy
Surgical site infection:
- None needed unless consideration of deeper infection
  - Laboratory:
    - WBC count
    - Wound cultures
      - Although polymicrobial contamination is common

Pelvic abscess:
- Laboratory:
  - WBC count
- Radiology:
  - Pelvic CT scan
  - MRI if CT contraindicated

Septic pelvic thrombophlebitis:
- Radiology:
  - Pelvic CT scan
  - MRI if CT contraindicated
  - High false-negative rate
  - Ultrasound is insensitive for this diagnosis

Differential Diagnosis
1. Post-partum fever:
   - Mastitis/breast abscess
   - Urinary tract infection
   - Pneumonia
   - Drug fever
   - Deep venous thrombosis
2. Endometritis:
   - Urinary tract infection
   - Retained placenta
3. Pelvic abscess:
   - Endometritis
   - Pelvic cellulitis
   - Hematoma
   - Appendicitis
   - Pyelonephritis
   - Operative injury to the bowel or ureter
4. Septic pelvic thrombophlebitis:
   - Pelvic abscess
   - Same differential diagnosis
   - Ovarian vein thrombosis

Therapeutics
1. Acute Treatment
   - **Endometritis**:
     - IV antibiotics until:
       - Afebrile for 24-48 hours
       - Normal wbc count
       - Tolerating oral intake
• Ambulating
  ▪ No need to continue antibiotics PO (French & Smaill, 2004)
  ▪ Unless staph bacteremia
• Clindamycin 900 mg q8 hr PLUS gentamicin 1.5 mg/kg q8 hr (French & Smaill, 2004)
  ▪ Cure rate 90-92%
  ▪ Gentamicin levels if not improving within 24-48 hr, or if renal impairment
  ▪ Once-daily dosing of gentamicin 5 mg/kg q24hr can also be used with same efficacy
• Piperacillin/tazobactam 3.375 g IV q 6 hr
• Ampicillin/sulbactam 3G IV q 6 hr PLUS gentamicin as above
• If suspect Chlamydia
  ▪ Add azithromycin 1G PO for one dose
  
  o **Surgical site infection:**
    ▪ Wound management:
      ▪ Open
      ▪ Drain
      ▪ Explore
      ▪ Irrigate
      ▪ Debride
      ▪ Important to distinguish whether fascial separation has occurred
        ▪ Leads to higher complications
      ▪ Ongoing local wound care
    ▪ Mild superficial incisional infections
      ▪ Usually managed without antimicrobials
    ▪ For more severe infections
      ▪ Especially when there is evidence of extension into adjacent tissue or systemic signs
      ▪ Empirically treat with broad spectrum antibiotics
        ▪ Including coverage for Staph
      ▪ Definitive antimicrobial treatment is guided by the clinical response of the patient
        ▪ When available, results of culture and sensitivity
      ▪ To endometritis regimen:
        ▪ Add vancomycin 1 g IV every 12 hours
        ▪ Alternatively, add nafcillin 2 g IV every 6 hours
  
  o **Episiotomy infection:**
    ▪ Open and clean wound
    ▪ Debridement of necrotic material
    ▪ Sitz baths
    ▪ Secondary closure
      ▪ Considered once wound is clean and granulating well
  
  o **Pelvic abscess:**
    ▪ Broad-spectrum antibiotics
    ▪ Including anaerobic coverage:
      ▪ Penicillin 5 million units IV q6 hr or
      ▪ Ampicillin 2 g IV q6 hr
- PLUS gentamicin 1.5 mg/kg IV q8 hr or 7 mg/kg of ideal body weight q24 hr
- PLUS clindamycin 900 mg IV q8 hr or
- Metronidazole 500 mg IV q12 hr
- If a patient is allergic to beta-lactam antibiotics
  - Vancomycin 500 mg IV q6 hr or
  - 1 g IV q12 hr can be substituted for penicillin or ampicillin
- Aztreonam 1 to 2 g IV q8 hr also can be used in lieu of gentamicin
  - When risk for nephrotoxicity
- Alternatively single agents:
  - Imipenem-cilastatin
    - 500 mg IV q6 hr or
  - Meropenem 1 g q8 hr
  - Provide excellent coverage against the usual pathogens
- Antibiotics should be continued until the patient is:
  - Afebrile and asymptomatic
    - Minimum of 24-48 hours
  - Most will require drainage
  - May be done percutaneously or
  - Surgically depending on location

  **Septic pelvic thrombophlebitis:**
  - Antibiotics as for endometritis
  - Heparin 5000 units IV
    - Followed by IV infusion to PTT 1.5-2.0 times control
  - Defervesence usually in 2-3 days
    - May take up to 7 days
    - Continue heparin until fever resolved for several days
    - Mean duration of treatment about 8 days
  - Long-term anticoagulation seldom necessary

2. Further Management
   - Endometritis:
     - If no response within 48-72 hr:
       - 20% are resistant organisms such as enterococcus: add ampicillin 2G IV q4 hr, or vancomycin in penicillin-allergic patients
       - Look for other sources of fever
         - Including retained products
     - Consider septic pelvic thrombophlebitis
   - Pelvis abscess:
     - If severely ill consider necrotizing fasciitis
       - Perhaps the most serious wound infection
       - Can be lethal
       - A surgical emergency
       - Characterized by a copious dishwater-like drainage
       - Dusky and friable subcutaneous tissue
       - Pale and devitalized fascia
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Septic pelvic thrombophlebitis:
- Active surveillance for septic emboli

Follow-Up
1. Return to office
   - Recurrence of patient symptoms
   - Usually within a few days of discharge from hospital
2. Refer to specialist
   - Failure of therapy within expected time course
   - Need for possible surgical intervention:
     - Surgical wound infection into deeper tissue layers
     - Pelvic abscess
     - Necrotizing fasciitis
3. Admit to hospital
   - All cases of endometritis
   - Deep surgical wound infections
   - Pelvic abscess
   - Septic pelvic thrombophlebitis

Prognosis
1. Excellent prognosis for all of these conditions
   - If identified and treated promptly
2. Potential morbidity and mortality as described above
3. Recurrence risk low with all of these conditions
   - Including septic pelvic thrombophlebitis

Prevention
1. Antibiotic prophylaxis for C-sections (Smaill & Gyte, 2010)
   - Particularly important if:
     - Ruptured membranes
     - Labor
   - With prophylaxis:
     - Risk of endometritis decreased 60%
     - Wound infection decreased as well
   - Tx:
     - Cefazolin 1 g IV, or
     - Ampicillin 1-2 g IV, or
     - For penicillin-allergic patients, Clindamycin 900 mg IV
     - Given immediately upon clamping of umbilical cord
   - Not clearly proven
3. Treatment of chorioamnionitis
   - Diagnosed prior to delivery
   - Helpful in preventing postpartum endometritis
References
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