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

- 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
- **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
- **Episiotomy infection:**
    - Open and clean wound
    - Debridement of necrotic material
    - Sitz baths
    - Secondary closure
        - Considered once wound is clean and granulating well
- **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

- 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
2. Antibiotic prophylaxis for instrumented vaginal delivery (Liabsuetrakul, Choobun, Peeyananjarassri, & Islam, 2004)
   - Not clearly proven
3. Treatment of chorioamnionitis
   - Diagnosed prior to delivery
   - Helpful in preventing postpartum endometritis

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