Pelvic Inflammatory Disease

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Overview of Presentation

1. Epidemiology
2. Microbiology
3. Pathogenesis
4. Transmission
5. Manifestations
6. Diagnosis
7. Treatment
8. Screening
PELVIC INFLAMMATORY DISEASE

Epidemiology
Pelvic inflammatory disease includes a spectrum of inflammatory disorders of the upper female genital tract.

- Endometritis, salpingitis, tubo-ovarian abscess and peritonitis are all types of PID.
Estimating PID incidence and prevalence is challenging

- PID includes a wide spectrum of disease ranging from asymptomatic to severe disease
- No single diagnostic test for PID
- Asymptomatic individuals may not be diagnosed
- PID is not a reportable condition in most US jurisdictions
- Surveillance data often relies on self-report or insurance claims data
• Review summarized PID burdens and trends in women 15-44 years of age
  - 6 national, 2 sentinel data sources from 2006-2016

• **Prevalence findings:**
  - Data subset: NHANES 2013-2016, NSFG 2015-2017
  - 4.1% self-reported history of PID (NHANES), 3.7% (NSFG)
  - 10% lifetime prevalence in women previously diagnosed with an STI
  - PID impacts >2 million US women in their lifetime
  - 26.5% decrease from 2008 to 2017
  • Increase in screening for *C. trachomatis* and *N. gonorrhoea*?
**EPIDEMIOLOGY – RISK FACTORS**

- **Age**
  - Increased rates of chlamydia and gonorrhea in ages 15-24 years
  - Cervical ectopy - columnar epithelium facilitates STI transmission

- **Age at sexual debut**
  - Sexual debut <12 years had 8 times PID prevalence compared to ≥18 years (PR = 8.6)

**EPIDEMIOLOGY – RISK FACTORS**

- **Number of sexual partners**
  - Women ≥10 lifetime male vaginal sex partners 3 times PID prevalence compared to single partner (PR = 3.6)

- **Sexual practices**
  - Two times the risk of PID in women reporting lesbian/bisexual vs heterosexual orientation (PR = 2.1)

EPIDEMIOLOGY - SEQUELAE

- **Fallopian tube scarring** from PID can result in:
  - Ectopic pregnancy – 9% \(^1\)
  - Tubal infertility – 16-18% \(^1,2\)
  - Chronic pelvic pain – 32-36% \(^2,3\)

- Sequelae more common after recurrent PID, repeated STI, and symptoms 5-30 days after treatment

**CDC Slide photo files.** Scanning electron microscopy photos (1200x) courtesy of D.L. Patton, University of Washington, Seattle, Washington
PELVIC INFLAMMATORY DISEASE

Microbiology
**Pathogens associated with acute PID** categorized as follows:

1. **Sexually transmitted infections**: *Neisseria gonorrhoea, Chlamydia trachomatis, Mycoplasma genitalium, Trichomonas vaginalis*


3. **Gastrointestinal or respiratory bacteria**: *Haemophilus influenzae, Streptococcus spp, group A streptococci, Escherichia coli, Bacteroides*

- Microbes detected depended on when study was performed, definition of PID used, and sensitivity and type of testing performed.

The PID Evaluation and Clinical Health (PEACH) Study

- Multicenter RCT to compare outpatient and inpatient treatment regimens among women with PID
- First study to evaluate effectiveness of regimens to prevent infertility, ectopic pregnancy, chronic pelvic pain, and recurrent PID
- Largest prospective study of PID ever conducted in North America
- Much of the data on PID is from this study

The PID Evaluation and Clinical Health (PEACH) Study

Effectiveness of inpatient and outpatient treatment strategies for women with pelvic inflammatory disease: Results from the Pelvic Inflammatory Disease Evaluation and Clinical Health (PEACH) Randomized Trial

Robert A. Ness, MD, MPH,a David E. Soper, MD,b Robert L. Holley, MD,c Jeffrey Peipert, MD,d Hugh Randall, MD,e Richard L. Sweet, MD,a,f Steven J. Sondheimer, MD,g Susan L. Hendrix, DO,h Antonio Amortegui, MD,a,f Giuliana Trucco, MD,a,f Thomas Songer, MPH, PhD,a Judith R. Lave, PhD,a Sharon L. Hillier, PhD,a,f Debra C. Bass, MS,a and Sheryl F. Kelsey, PhD,a for the PID Evaluation and Clinical Health (PEACH) Study Investigators

*Pittsburgh and Philadelphia, Pa, Charleston, SC, Birmingham, Ala, Providence, RI, Atlanta, Ga, and Detroit, Mich*

**Design:** 831 women, mild-moderate PID, multicenter RCT

- Inpatient (IV cefoxitin & IV doxycycline) vs outpatient (cefoxitin IM & oral doxycycline)

**Short-term outcomes:** Clinical and microbiologic improvement

**Long-term outcomes:** Pregnancy rate, recurrence of PID, chronic pelvic pain, ectopic pregnancy

**INPATIENT**
- IV cefoxitin 2g q 6h
- IV doxycycline 100 BID
- X 48h minimum
- Then doxy po x 14d

**OUTPATIENT**
- IM cefoxitin 2g x 1 + probenecid
- PO doxycycline 100 BID x 14d

Ages 14-37, from ED, STI units of 13 clinical sites, 1996-1999
  - 75% African American
  - 3/4 high school education or less
  - 1/3 previous PID diagnosis
  - 40% GC or CT or both

Few differences in inpatient vs outpatient at baseline:
  - Outpatient significantly more likely to have an IUD, have BV, and somewhat less likely to have had a tubal ligation
  - Women with TOA excluded
# Mild-mod PID

Inpatient vs. Outpatient

## Table III. Long-term outcomes by treatment group

<table>
<thead>
<tr>
<th></th>
<th>Outpatient</th>
<th>Inpatient</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Pregnancy†</td>
<td>172</td>
<td>42.0%</td>
</tr>
<tr>
<td>Live birth</td>
<td>72</td>
<td>17.6%</td>
</tr>
<tr>
<td>Spontaneous abortion</td>
<td>28</td>
<td>6.8%</td>
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<tr>
<td>Induced abortion</td>
<td>25</td>
<td>6.1%</td>
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<tr>
<td>Ongoing pregnancy</td>
<td>47</td>
<td>11.5%</td>
</tr>
<tr>
<td>Infertile‡</td>
<td>71</td>
<td>18.4%</td>
</tr>
<tr>
<td>Self-reported recurrent PID</td>
<td>51</td>
<td>12.4%</td>
</tr>
<tr>
<td>Pelvic inflammatory disease†</td>
<td>7</td>
<td>1.7%</td>
</tr>
<tr>
<td>Hysterectomy†</td>
<td>4</td>
<td>1.0%</td>
</tr>
<tr>
<td>Ectopic pregnancy†</td>
<td>7</td>
<td>1.0%</td>
</tr>
<tr>
<td>Tubal obstruction§</td>
<td>128</td>
<td>33.7%</td>
</tr>
<tr>
<td>Graded CPP</td>
<td></td>
<td></td>
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<tr>
<td>No CPP</td>
<td>252</td>
<td>66.3%</td>
</tr>
<tr>
<td>CPP, low pain and disability</td>
<td>31</td>
<td>8.2%</td>
</tr>
<tr>
<td>CPP, high pain and low disability</td>
<td>35</td>
<td>9.2%</td>
</tr>
<tr>
<td>CPP, high pain and high disability</td>
<td>62</td>
<td>16.3%</td>
</tr>
</tbody>
</table>

CPP: Chronic pelvic pain.

*Odds ratios were adjusted for tubal ligation (yes/no), bacterial vaginosis (yes/no), and IUD in place (yes/no).

†Twenty-three women did not have follow-up data and were therefore excluded from analyses of pregnancy, hysterectomy, ectopic pregnancy, and recurrent pelvic inflammatory disease.

‡Calculated among women with at least 1 year of completed follow-up.

§Calculated among infertile women evaluated with hysterosalpingograms.

Calculated among women with at least 2 follow-ups.

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**At 35 months, no difference in:**
- Pregnancy rates & time to pregnancy
- PID recurrence
- Ectopic pregnancy

**At 30 days, no difference in:**
- Adverse outcomes (except phlebitis in IV doxy group)
• **Chronic PID** may be caused by organisms such as *Mycobacterium tuberculosis* and *Actinomyces* species

• Most infections are **polymicrobial**

• Sometimes no etiologic agent is recovered

• Recovery of a particular organism does not mean it is a causal organism of PID
Early studies of PID etiology may have been limited by testing technology prior to the development of highly sensitive NAAT.

In clinically diagnosed PID, up to 35% of participants are found to have either *C. trachomatis* or *N. gonorrhoea*.

When endometritis is included in the diagnostic criteria, up to 52% have *C. trachomatis* or *N. gonorrhoea* detected.

Over half of PID cases are not attributable to these STIs.
MICROBIOLOGY – *Mycoplasma genitalium*

- Associated with cervicitis, PID, preterm delivery, spontaneous abortion and infertility; meta-analysis suggested a 2-fold increase in these outcomes in women with *M. genitalium*

- Detected in 10-30% of women with clinical cervicitis

- Identified in endometrium or cervix of women with PID more than in women without PID

- Prevalence of *M. genitalium* among women with PID is 4-22%

MICROBIOLOGY – *Mycoplasma genitalium*

- Most studies are cross-sectional but show consistent association of *M. genitalium* with cervicitis and PID
- Prospective studies have shown risk of PID in setting of *M. genitalium* but often lack statistical power
- No data to show that treatment of *M. genitalium* decreases the risk of PID or endometritis
MICROBIOLOGY - *Trichomonas vaginalis*

- Rare reports of association with upper genital tract specimens
- PEACH trial data analysis (N=647):
  - Treated clinically for PID, followed for 84 months for sequelae
  - Adjusted for GC, CT, *M genitalium*, and BV as well as age & race
  - *T. vaginalis* present in 13% of women (microscopy identification)
  - Odds of endometritis at baseline twice as high among women with trichomoniasis compared to those without (aOR 1.9, 95%CI 1.0-3.3)
  - Persistent endometritis prevalent in 52% at 30 days, more common in women with baseline trichomoniasis (not significant)
  - Infertility and recurrent PID more common in those with *T. vaginalis*

Trichomonas vaginalis Is Associated with Pelvic Inflammatory Disease in Women Infected with Human Immunodeficiency Virus

Prashini Moodley,1 David Wilkinson,4 Cathy Connolly,3 Jack Moodley,2 and A. Willem Sturm1

1Africa Centre for Population Studies and Reproductive Health and Departments of Medical Microbiology, 2Obstetrics and Gynaecology, Nelson R. Mandela School of Medicine, University of Natal, and 3Biostatistics Unit, Medical Research Council, Durban, South Africa; 4South Australian Centre for Rural and Remote Health, Adelaide University and University of South Australia, Whyalla and Adelaide, Australia

- South African women with vaginal discharge were recruited (N=696)
- 17% of women with vaginal discharge had PID
- Vaginal and cervical specimens tested for Neisseria gonorrhoea, Chlamydia trachomatis, Trichomonas vaginalis, and bacterial vaginosis
- Further stratified by HIV status
MICROBIOLOGY - *Trichomonas vaginalis*

**Table 1.** Prevalence of sexually transmitted infections and bacterial vaginosis among women with vaginal discharge only and among those with vaginal discharge and clinical pelvic inflammatory disease (PID).

<table>
<thead>
<tr>
<th>Infectious agent or condition</th>
<th>No. (%) of patients</th>
<th>RR of PID (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All (n = 696)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Had discharge only (n = 577)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Had discharge with PID (n = 119)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(P)</td>
<td></td>
</tr>
<tr>
<td>Bacterial vaginosis</td>
<td>481 (69)</td>
<td>.7</td>
</tr>
<tr>
<td><em>Trichomonas vaginalis</em></td>
<td>205 (29)</td>
<td>.03</td>
</tr>
<tr>
<td><em>Neisseria gonorrhoeae</em></td>
<td>86 (12)</td>
<td>.06</td>
</tr>
<tr>
<td><em>Chlamydia trachomatis</em></td>
<td>74 (11)</td>
<td>.8</td>
</tr>
</tbody>
</table>

• Higher PID risk in those with *T. vaginalis* \((p=0.03)\)
• Association only seen in those with HIV-1

• Overall, no prospective data evaluating link to PID in those with *T. vaginalis* – a clear role is yet to be determined

Bacterial vaginosis (BV) is a dysbiosis or shift in lactobacillus species predominance to high concentrations of anaerobic bacteria
- *G. vaginalis*, *Prevotella* sp., *Mobiluncus* sp, and other BV-associated bacteria

Several studies have demonstrated detection of BV-associated bacterial species in women with endometritis and salpingitis

Longitudinal studies have shown increased risk for incident PID in those with Amsel’s or Nugent score BV diagnosis, or culture-based BV-associated organisms
MICROBIOLOGY – Oropharyngeal, respiratory and GI associated organisms

- Oropharyngeal, respiratory, and GI associated organisms have been recovered from tubes, endometrium or peritoneum in patients with salpingitis,

- Unclear if organisms are causal or whether growth is opportunistic in the setting of alterations of the upper genital tract during PID

- Inflammatory damage to the cilia of the fallopian tubes and therefore altered transit of an egg from ovary to endometrium is likely cause of infertility and ectopic pregnancy
PELVIC INFLAMMATORY DISEASE

Pathogenesis
PATHOGENESIS

• PID can occur:
  1. As sequelae of STI such as *Chlamydia trachomatis* and *Neisseria gonorrhea*
  2. When respiratory or GI pathogens infect the female genital tract
  3. When organisms that are found in the microbiome of the genital tract ascend to the upper tract – the endometrium and fallopian tubes - and cause inflammation and disease
PATHOGENESIS

• It is unclear why organisms ascend to the upper genital tract and cause an inflammatory reaction

• Some have invoked the host immune response as a factor in infection, as well as the viability, number, and pathogenicity of the organisms
PELVIC INFLAMMATORY DISEASE

Transmission
TRANSMISSION & PARTNER MANAGEMENT

• Transmission is based on the etiologic agent(s) of PID

• Sexual partners within 60 days of the woman’s PID symptom onset should be examined and tested for STIs

• Partners should be treated presumptively for gonorrhea and chlamydia (even if these pathogens were not detected in the index patient with PID)
  - Male partners of women with PID caused by *C. trachomatis* or *N. gonorrhoea* are often asymptomatic
PELVIC INFLAMMATORY DISEASE

Manifestations
MANIFESTATIONS – Signs and symptoms

- **Wide range of disease** – asymptomatic, subclinical, acute, subacute, severe, making the diagnosis challenging

- Typical symptoms include
  - Lower abdominal pain, pelvic pain, cramping, dysuria, urinary frequency, vaginal discharge, intermittent or postcoital bleeding
  - Fever, chills, nausea, vomiting, purulent vaginal discharge

- Symptoms can be nonspecific and not always attributable to the genital tract: dyspareunia, dysuria, GI symptoms

- Physical exam: cervical motion tenderness, uterine or adnexal tenderness

• Because PID often presents with nonspecific symptoms, there may be overlap with other diagnoses:
  - Ectopic pregnancy
  - Acute appendicitis
  - Endometriosis
  - Endometritis
  - Ovarian cyst, ovarian torsion
  - Nephrolithiasis
  - Urinary tract infection
MANIFESTATIONS - Complications

- **Fitz-Hugh-Curtis Syndrome** (perihepatitis)
  - Inflammation of the liver capsule from PID
  - Presents with RUQ pain that worsens with movement
  - Laparoscopy: “violin string-like adhesions” between liver and anterior abdominal wall

- **Tubo-ovarian abscess**
  - Reported in approximately 30% of PID cases
  - Abscess of the adnexa – tubes, ovaries, surrounding structures
  - Presents with abdominal or pelvic pain, fever, vaginal discharge, nausea, and abnormal vaginal bleeding
  - Managed medically but may need percutaneous or surgical drainage

MANIFESTATIONS – Sequelae of PID

• Much of the morbidity associated with PID is secondary to the chronic sequelae which can develop

• **Tubal infertility**
  - Reported in 16-18% of women
  - Risk increases with repeat infection or severe disease

• **Ectopic pregnancy**
  - Reported 9% in one study of women with salpingitis

• **Chronic pelvic pain**
  - Common post PID treatment
  - Up to 32% in the PEACH trial

PELVIC INFLAMMATORY DISEASE

Diagnosis
• Diagnosis of PID is challenging due to wide range of clinical presentations

• Laparoscopy can be used to diagnose salpingitis, but not endometritis or more subtle inflammation

• Clinical diagnosis of PID has PPV for salpingitis of 65-90% compared with laparoscopy
  - Higher PPV among sexually active young women, women attending STI clinics, those who live in communities with high rates of chlamydia and gonorrhea
“No single historical, physical or laboratory finding is both sensitive and specific for the diagnosis of PID.”
- Increased sensitivity at the expense of specificity and vice versa

Providers should have a low threshold to treat empirically given the long-term sequelae of unrecognized and untreated disease

Intent of the diagnostic recommendations for PID are to help providers recognize when PID should be on the differential and therefore when to obtain further information or data in order to diagnose the condition
Presumptive treatment for PID should be initiated in any sexually active young women and other women at risk for STIs if they are experiencing pelvic or lower abdominal pain not explained by another illness AND one or more of the following 3 minimum criteria on pelvic examination:

- Cervical motion tenderness
- Uterine tenderness
- Adnexal tenderness
DIAGNOSIS – 2021 CDC STI Treatment Guidelines

• Other clinical findings which support the diagnosis:
  - Oral temperature > 38.3°C (>101°F)
  - Abnormal cervical mucopurulent discharge or cervical friability
  - Presence of abundant WBC on saline microscopy of vaginal fluid
  - Elevated erythrocyte sedimentation rate (ESR) or c-reactive protein (CRP)
  - Laboratory documentation of cervical infection with *N. gonorrhoea* or *C. trachomatis*

• Majority of women with PID have either mucopurulent cervical discharge or evidence of WBC on wet prep
  - If cervical discharge appears normal and no WBC on wet prep, a PID diagnosis is unlikely and should seek alternate diagnosis
DIAGNOSIS – 2021 STI Treatment Guidelines

• Some clinical situations may warrant additional diagnostic evaluation
  - Radiographic imaging, biopsy, laparoscopy

• Endometrial biopsy is warranted in women undergoing laparoscopy but have no visual evidence of salpingitis

• If biopsy, imaging or laparoscopy are pursued, additional criteria to support PID diagnosis are:
  - Histopathologic evidence of endometritis on endometrial biopsy
  - Ultrasound or MRI showing thickened, fluid-filled tubes with or without pelvic free fluid or tubo-ovarian abscess; Doppler evidence of infection
  - Laparoscopic findings consistent with PID
PELVIC INFLAMMATORY DISEASE

Treatment
A Randomized Controlled Trial of Ceftriaxone and Doxycycline, With or Without Metronidazole, for the Treatment of Acute Pelvic Inflammatory Disease

Harold C. Wiesenfeld,¹,² Leslie A. Meyn,¹,² Toni Darville,³ Ingrid S. Macio,² and Sharon L. Hillier¹,²

¹Department of Obstetrics, Gynecology and Reproductive Sciences, University of Pittsburgh, Pittsburgh, Pennsylvania, USA, ²Magee-Womens Research Institute, Pittsburgh, Pennsylvania, USA, and ³Department of Pediatrics, University of North Carolina at Chapel Hill, Chapel Hill, North Carolina, USA

● Study designed to address whether adding metronidazole improves clinical and microbiologic cure in women with acute PID
● Randomized N=233 women to standard of care (ceftriaxone/doxy) or standard of care + metronidazole and measured responses at 3 and 30 days
Clinical improvement was high in the two groups at 3 days (83% with metronidazole vs 80% without, P=0.74) and 30 days (97% with metronidazole vs 90% without, P=0.13)

Only a small proportion of women (22%) tested positive for *C. trachomatis* or *N. gonorrhea* (as with other trials, i.e. PEACH trial* - 35%)

Rates of CT and GC did not differ among groups at 30 days, however rates of BV, and endometrial cultures for anaerobic organisms were significantly lower in the metronidazole arm, rates of *T. vaginalis* trend to lower as well
  - Anaerobic organisms 8% vs 21%, P<0.05),
  - *M. genitalium* reduced (4% vs 14%, P<0.05),
  - BV (20% vs 54%, P<0.001),
  - *T. vaginalis* (5% vs 12%, P=0.10)

Pelvic tenderness less common among women with metronidazole (9% vs 20%), P<0.05

Adverse events similar in each treatment arm
• All recommended regimens for PID provide broad spectrum coverage of likely etiologic organisms
  - Multiple regimens effective for microbiologic and clinical cure in short term follow-up
  - Limited data on comparisons among regimens, clearance of infection from tubes or endometrium or on incidence of long-term sequelae

• All regimens for PID should provide treatment of *N. gonorrhea* and *C. trachomatis*
  - Negative vaginal, endocervical or urine testing for GC and CT does not rule out upper genital tract disease

• Treatment should be started as soon as possible
  - Case control study: 443 women with PID – increased risk for infertility or ectopic pregnancy if care delayed 3 or more days after onset of abdominal pain

The decision to provide treatment in a hospital setting should be based on provider judgment and whether the woman meets any of the following criteria:

- Surgical emergencies (e.g. appendicitis) cannot be excluded
- Tubo-ovarian abscess
- Pregnancy
- Severe illness, nausea and vomiting, or oral temp >38.5°C (>101°F)
- Unable to follow up or tolerate an outpatient oral regimen
- No clinical response to oral antimicrobial therapy
TREATMENT – PARENTERAL

- Efficacy of parenteral therapy has been demonstrated in RCTs. Options:
  - Cetriaxone 1 g IV every 24 hours PLUS doxycycline 100mg PO or IV every 12 hours PLUS metronidazole 500mg PO or IV every 12 hours
  - Cefotetan 2g IV every 12 hours plus doxycycline
  - Cefoxitin 2g IV every 6 hours plus doxycycline

- For severe cephalosporin allergy, clindamycin and gentamicin is an alternative regimen

- Oral therapy can usually be initiated within 24-48 hours of clinical improvement, guided by clinical judgment

- For women with TOA, >24hrs of inpatient observation is recommended
TREATMENT – Parenteral

- Doxycycline should be administered orally when feasible, secondary to pain with IV infusion.
- Oral and IV administration of doxycycline and metronidazole have similar bioavailability.
- After clinical improvement with parenteral therapy, can transition to oral therapy with:
  - Doxycycline 100mg BID and metronidazole 500mg BID to complete 14 days of antimicrobial therapy.
- If clindamycin/gent was utilized, then can transition to clindamycin 450 4x/day or doxycycline 100mg BID to complete 14 days. If TOA, then metronidazole should be added to the regimen.
TREATMENT – INTRAMUSCULAR/ORAL

• IM or oral therapy can be used in mild to moderate PID

• No differences in clinical outcomes between inpatient and outpatient regimens

• Options include:
  - *Ceftriaxone 500mg IM (1g if wt >150kg) in a single dose plus doxycycline plus metronidazole to complete 14 days of therapy*
  - Instead of ceftriaxone can use cefoxitin 2g IM single dose plus probenecid 1g orally in a single dose OR another 3rd generation parenteral cephalosporin plus doxycycline and metronidazole
The optimal cephalosporin is unclear.
- Cefoxitin has better anaerobic coverage, ceftriaxone has better coverage against *N. gonorrhea*.

The addition of metronidazole provides increased anaerobic coverage as well as treating organisms associated with BV.

No published data to support using oral cephalosporins.
TREATMENT – IM/Oral - Alternatives

• For severe cephalosporin allergy: IF community prevalence AND individual risk for gonorrhea are low, and follow up is likely, then can consider:
  1. Levofloxacin 500 daily + metronidazole 500 BID x 14 days
  2. Moxifloxacin 400 daily x 14 days
  3. Azithromycin 500 IV daily x 1-2 doses then 250 PO daily x 7 days or plus metronidazole 500 TID x 12-14 days

• GC testing should be performed before starting alternative therapy

• If GC positive, treatment based on susceptibilities – consult ID if data not available

Gonorrhea is the second most commonly reported bacterial infection in the United States.

CDC estimates that 1.6 million new gonorrhea infections occur each year, and that about half of those infections are resistant to at least one antibiotic.

Today, the United States has just one recommended gonorrhea treatment option remaining.

● Does the microbiology matter in the setting of similar symptomatic clinical cure?
● Culture of anaerobic organisms in endometrium linked to higher rates of endometritis, which is associated with pelvic pain and infertility
● Surprising was the lower rates of *M. genitalium* in the metronidazole containing regimen (*M. genitalium* not sensitive to the nitroimidazoles)
TREATMENT

• Women should abstain from sexual contact until therapy is complete and sex partners have been treated

• Test all women with PID for gonorrhea, chlamydia, HIV and syphilis

• If no clinical improvement >72 hours after IM/oral therapy, then consider hospitalization and re-evaluation of diagnosis, antimicrobials, consider imaging

• Test for reinfection with gonorrhea or chlamydia recommended at 3 months – reinfection is common
• Abscess involving the fallopian tubes, ovaries
• Most commonly arises as a complication of PID
  - Prior history of PID is obtained in only 30% of patients with TOA
  - Present in approximately 35% of women admitted with PID
• Most common in the 3rd or 4th decade of life
• An indication for hospitalization in PID
MANAGEMENT - TOA

• Pertinent positives
  - Pain 80%
  - Vaginal discharge 25%
  - Abnormal uterine bleeding 20%

• Challenging negatives
  - 35-73% afebrile
  - 25% with normal WBC
  - 80% negative gonorrhea or chlamydia testing
MANAGEMENT - TOA

- **Ruptured**
  - Emergent surgery
  - Mortality increased

- **Unruptured – controversial**
  - Medical management
  - Image-guided drainage
    - CT
    - Ultrasound
  - Laparoscopic drainage

Medical management overall associated with a 70% success rate

Approximately 25% of cases require either drainage or surgery

Tuboovarian Abscesses: Is Size Associated with Duration of Hospitalization & Complications?

Jason DeWitt, Angela Reining, Jenifer E. Allsworth, and Jeffrey F. Peipert

Design:
- Retrospective study, 135 patients with TOA
- Abscess dichotomous: <8 cm vs >8 cm

Outcomes:
- Average size medically treated: 6.3 cm
- Average size requiring drainage: 7.7 cm
**Every 1 cm increase in size associated with increase in hospitalization by 0.4 days (P=0.001)**

**>8 cm associated with increased complications (P<0.01)**

<table>
<thead>
<tr>
<th></th>
<th>All patients (N = 135)</th>
<th>Abscess ≤8 cm (N = 112)</th>
<th>Abscess &gt;8 cm (N = 23)</th>
</tr>
</thead>
<tbody>
<tr>
<td># days hospitalized mean (SD)</td>
<td>4.6 (3.6)</td>
<td>4.4 (3.4)</td>
<td>5.7 (4.2)</td>
</tr>
<tr>
<td># days febrile (&gt;38.2)</td>
<td>1.1 (1.8)</td>
<td>1.10 (1.6)</td>
<td>1.35 (2.5)</td>
</tr>
<tr>
<td>N (%)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Requiring drainage/surgery</td>
<td></td>
<td></td>
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<tr>
<td>Drainage*</td>
<td>11 (8%)</td>
<td>9 (8%)</td>
<td>2 (9%)</td>
</tr>
<tr>
<td>Surgery</td>
<td>34 (25%)</td>
<td>26 (23%)</td>
<td>8 (35%)</td>
</tr>
</tbody>
</table>
MANAGEMENT – TOA

• Size of TOA may be related to prognosis
  - Reed et al:
    • ≥ 10 cm greater than 60% chance of surgery
    • 4-6 cm less than 20% chance of requiring surgery

• Studies, often case series, cite concern for decreased fertility if not drained –
  - however bias in selection criteria so data is not definitive
Early ultrasound-guided transvaginal drainage of tubo-ovarian abscesses: a randomized study

T. Perez-Medina, M. A. Huertas and J. M. Bajo

40 patients w abscess <10cm

**RCT:**
- Antibiotics alone
- Early ultrasound-guided drainage (study group) + antibiotics
- Both groups got clinda/gent

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<tr>
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<th>Success</th>
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<th>Failure</th>
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<td><strong>Initial</strong></td>
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<td>Study (n = 20)</td>
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<td>90</td>
<td>2</td>
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<tr>
<td>Control (n = 20)</td>
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<td><strong>Follow up</strong></td>
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<td>Study (n = 18)</td>
<td>17</td>
<td>94</td>
<td>1</td>
<td>6</td>
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<tr>
<td>Control (n = 13)</td>
<td>10</td>
<td>77</td>
<td>3</td>
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</table>
• IUDs are one of the most effective contraceptive methods

• Risk of PID with IUD generally only in first 3 weeks after insertion

• IUD does not need to be removed in all PID

• If no clinical improvement within 48-72 hours of PID treatment, then can consider removing IUD
Retention of intrauterine devices in women who acquire pelvic inflammatory disease: a systematic review

Naomi K. Tepper\textsuperscript{a,\*}, Maria W. Steenland\textsuperscript{a}, Mary E. Gaffield\textsuperscript{b}, Polly A. Marchbanks\textsuperscript{a}, Kathryn M. Curtis\textsuperscript{a}

\textsuperscript{a}Division of Reproductive Health, Centers for Disease Control and Prevention, Atlanta, GA 30341, USA
\textsuperscript{b}Department of Reproductive Health and Research, World Health Organization, CH-1211 Geneva 27, Switzerland

- Systematic review
- Treatment outcomes not different between women with PID who retained IUD compared to those who removed
- Most studies primarily included women with copper-containing or other non-hormonal IUDs
- No available data on treatment outcomes among women with levonorgestrel-releasing IUDs
PELVIC INFLAMMATORY DISEASE

Screening
• Screening for age and risk related STIs should be performed as this has been shown to decrease risk of PID

• Low threshold to treat empirically for PID in the right clinical setting
PELVIC INFLAMMATORY DISEASE

Summary
SUMMARY – Key Points

• Screening for age and risk-related STIs is important in decreasing risk for PID

• Partner notification, evaluation and treatment as well as testing for reinfection in patient and partner are paramount

• Low threshold to treat PID empirically in the appropriate clinical setting given the significant sequelae of unrecognized and untreated disease

• Etiology is generally polymicrobial and many options for treatment exist – both parenteral and IM/oral – follow CDC STI Treatment guidelines

• Clinical follow up in the short and long term is important, given the potential for long term sequelae such as infertility, ectopic pregnancy and chronic pelvic pain
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