Pelvic Inflammatory Disease

GRAND ROUNDS 03/07/18
HOLLY MONTGOMERY, MD
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(C) body temperature
(D) her age
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(A) diagnostic laparoscopy
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A patient is seen for consultation in your office with a history of pelvic pain and infertility. In the past her pain was well controlled with oral contraceptives but she now desires fertility. You review an operative note from a diagnostic laparoscopy performed by her previous physician. Which of the following laparoscopic finding is the LEAST likely to be associated with a diagnosis of endometriosis?

- A. Allen-Masters windows
- B. Endometrioma
- C. Fitz-Hugh Curtis
- D. Flat stellate lesions
- E. Hemosiderin deposition
A 15-year-old G0 patient presents to clinic for contraception counseling. She is having regular periods that started at the age of 13. She is sexually active with one partner but has had three lifetime partners. She denies any discharge or genitourinary complaints. She has no history of sexually transmitted infections. She has received all of her Gardasil vaccination and is up to date on all of her other vaccinations. She is considering Nexplanon for contraception. Her last menstrual period was two months ago. She is not currently using any contraception.

In addition to ordering a urine pregnancy test, which additional exam is recommended?

- A. Urine chlamydia/gonorrhea yearly
- B. Pap smear after 3 years of sexual activity
- C. HPV screening
- D. Full STD panel testing
- E. Pelvic examination
Outline

Pathogenesis
Microbiology
Risk Factors
Clinical Manifestation
Diagnosis
Long Term Complications
Treatment
Review
Pathogenesis – Normal Vaginal Flora

Anaerobes > aerobes (10:1)

Microorganisms can produce lactic acid and hydrogen peroxide

Vagina secretes leukocyte protease inhibitors which confer protection

Upper reproductive tract is not sterile but presence of bacteria does not indicate active infection

pH is typically between 4 and 4.5
  ◦ Glycogen is produced by healthy vaginal cells which is then metabolized to lactic acid (Lactobacillus)

Changes can lead to alterations in prevalence of various species
  ◦ Premenarchal and postmenopausal
  ◦ Menstrual cycle
  ◦ Broad spectrum antibiotics
  ◦ Hysterectomy

Endocervical canal serves as a barrier
## Microbiology

### Aerobes

**Gram-positive**
- *Lactobacillus* spp.
- Diphtheroids
- *Staphylococcus aureus*
- *Staphylococcus epidermidis*
- *Group B Streptococcus*
- *Enterococcus faecalis*
- *Staphylococcus* spp.
- *Actinomyces israelii*

**Gram-negative**
- *Escherichia coli*
- *Klebsiella* spp.
- *Proteus* spp.
- *Enterobacter* spp.
- Acinetobacter spp.
- *Citrobacter* spp.
- *Pseudomonas* spp.

### Anaerobes

**Gram-positive cocci**
- *Peptostreptococcus* spp.
- *Clostridium* spp.

**Gram-positive bacilli**
- *Lactobacillus* spp.
- *Proprionibacterium* spp.
- *Eubacterium* spp.
- *Bifidobacterium* spp.

**Gram-negative**
- *Prevotella* spp.
- *Bacteroides* spp.
- *Bacteroides fragilis group*
- *Fusobacterium* spp.
- *Veillonella* spp.

**Yeast**
- *Candida albicans* and other spp.
Pathogenesis – Background

Infection of the upper female reproductive tract organs
  ◦ Includes endometritis, salpingitis, oophoritis, pelvic peritonitis, perihepatitis and/or tubo-ovarian abscess

Results in
  ◦ 106,000 outpatient visits annually each year
  ◦ 60,000 hospitalizations each year
  ◦ $2,000 USD to treat
  ◦ $6,000 USD to treat for chronic pelvic pain

Bacterial vaginosis while not a risk factor may aid ascension

Ascension is also enhanced during menstruation due to loss of endocervical barrier

Prior tubal ligation may be protective

Can also be caused by direct extension
Pathogenesis – Background

Classic salpingitis is associated with *N gonorrhoeae* and *C trachomatis*
- Gonococcus causes direct inflammatory response
  - 15% of women with endocervical gonorrhea go on to develop PID
  - Clinically more severe than chlamydia
- Chlamydia causes cell-mediated immune response
  - Most common bacterial STI, most common reportable infectious disease
  - 1.5 million cases annually
  - Accounts for 1/3 of the cases of PID
  - 10-15% of women with endocervical chlamydia go on to develop PID

*Less than 10% are not STIs*
- *Mycoplasma genitalium* – likely cause in pre-menopausal group
- *E coli* and colonic anaerobes – likely cause in post-menopausal group

Pathogens cannot always be known for any given patient
<table>
<thead>
<tr>
<th>Risk Factors</th>
<th>Other STIs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Douching</td>
<td>Sexual partner with urethritis or gonorrhea</td>
</tr>
<tr>
<td>Single status</td>
<td>Previous diagnosis of PID</td>
</tr>
<tr>
<td>Substance abuse</td>
<td>Not using mechanical and/or chemical contraceptive barriers</td>
</tr>
<tr>
<td>Multiple sexual partners</td>
<td>Endocervical testing positive for Neisseria gonorrhoeae or Chlamydia trachomatis</td>
</tr>
<tr>
<td>Lower socioeconomic status</td>
<td></td>
</tr>
<tr>
<td>Recent new sexual partner(s)</td>
<td></td>
</tr>
<tr>
<td>Younger age (10 to 19 years)</td>
<td></td>
</tr>
<tr>
<td>Other STIs</td>
<td></td>
</tr>
</tbody>
</table>
Clinical Manifestations – Types

Acute
- Sudden onset
- Severe pain

Chronic
- Indolent
- Low-grade infection
- Mild pain
- Weight loss

“Silent” or Subclinical
Clinical Manifestations – “Silent”

“Silent”

◦ Doesn’t prompt presentation to health care provider
◦ Produces significant sequelae
◦ Diagnosed retroactively in women with tubal-factor infertility who lack history of PID
◦ May have antibodies to chlamydia and gonorrhea
◦ May have evidence at laparoscopy/laparotomy
**Clinical Manifestations - Symptoms**

<table>
<thead>
<tr>
<th>Lower abdominal and/or pelvic pain</th>
<th>Vomiting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mucopurulent vaginal discharge</td>
<td>Diarrhea</td>
</tr>
<tr>
<td>Menorrhagia</td>
<td>Dysmenorrhea</td>
</tr>
<tr>
<td>Fevers</td>
<td>Dyspareunia</td>
</tr>
<tr>
<td>Chills</td>
<td></td>
</tr>
<tr>
<td>Anorexia</td>
<td></td>
</tr>
<tr>
<td>Nausea</td>
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</tbody>
</table>
## Diagnosis – Differential

### Differential diagnosis for pelvic inflammatory disease

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Suggestive features</th>
</tr>
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<tbody>
<tr>
<td>Ectopic pregnancy</td>
<td>History of missed menses, positive pregnancy test</td>
</tr>
<tr>
<td>Ovarian cyst rupture/torsion</td>
<td>Sudden onset of severe pain</td>
</tr>
<tr>
<td>Endometriosis</td>
<td>Cyclical or chronic pain</td>
</tr>
<tr>
<td>Cystitis</td>
<td>Urinary frequency and/or dysuria</td>
</tr>
<tr>
<td>Appendicitis</td>
<td>Pain localized to the right iliac fossa, vomiting</td>
</tr>
<tr>
<td>Diverticulitis</td>
<td>Bowel symptoms in older women</td>
</tr>
<tr>
<td>Irritable bowel syndrome</td>
<td>Generalized abdominal pain, constipation, diarrhea</td>
</tr>
<tr>
<td>Functional pain</td>
<td>Other causes have been excluded</td>
</tr>
</tbody>
</table>
Clinical Manifestations – Assessment

Index of suspicion should be high

History of present illness
- Leukorrhea
- Mucopurulent discharge
- Abdominal and/or pelvic pain
- Abnormal uterine bleeding
- Associated symptoms

History
- Sexual history
- Previous STIs
- Previous PID
- LMP

Physical Exam
- Abdominal exam
- Pelvic exam

Laboratory Evaluation
- hCG
- CBC
- LFTs
- UA
- Wet prep
- Endocervical testing
- Gram stain
- HIV, RPR/VDRL, Hepatitis panel

Treatment should not be delayed for lab results
Diagnosis – Criteria

Pelvic or lower abdominal pain or one or more of the following minimal criteria on pelvic exam
- Cervical motion tenderness
- Uterine tenderness
- Adnexal tenderness

Confirmatory criteria for pelvic inflammatory disease
- Endometrial biopsy that shows evidence of endometritis
- Imaging study that reveals hydrosalpinges, with or without free pelvic fluid, or tubo-ovarian abscess, or Doppler ultrasonographic studies that suggest pelvic infection
- Laparoscopic evidence of PID

The presence of the following factors will enhance the specificity of diagnosing the disease
- Oral temp > 38.3 C (101 F)
- Abnormal cervical or vaginal mucopurulent discharge
- Presence of abundant white blood cells on saline microscopy of vaginal fluid
- Elevated ESR
- Elevated CRP
- Lab documentation of cervical infection with Neisseria gonorrhoeae or Chlamydia trachomatis
Diagnosis – Imaging

In acutely ill women suspected to have PID complications or who do not improve within 72 hours

Pelvic imaging
  ◦ US preferred
  ◦ CT/MRI used to exclude alternative diagnoses

Laparoscopy can be useful if
  ◦ Patient failed outpatient treatment for PID (to look for alternative causes)
  ◦ Patient who’s symptoms are not clearly improving or are worsening after approximately 72 hours of inpatient treatment

Endometrial biopsy
  ◦ Would see leukocytes but not specific or helpful
Diagnosis – Hydrosalpinx

Anechoic
Tubular
Thickened
Fluid-filled fallopian tube
Serpentine and incomplete septa
Diagnosis – Hydrosalpinx
Diagnosis – Hydrosalpinx

Distended along entire length
Distal ends are dilated and clubbed
Fimbria are replaced by or encased by smooth adhesions
Diagnosis – Fitz-Hugh-Curtis
Diagnosis – Tubo-ovarian abscess

Complex
Thick-walled
Multilocular
Cystic Collection
Diagnosis – Tubo-ovarian abscess

Inflamed and suppurative fallopian tube adhered to the ovary

Tubo-ovarian complex – if planes still present

Tubo-ovarian abscess – if planes are lost

Typically unilateral

May involve adjacent structures

Can follow appendicitis, diverticulitis, IBD or surgery

Fig 2: Laparoscopy photograph of right tubo-ovarian abscess with pus
Long Term Complications

Risk factors
- Chlamydia infection
- Delay in seeking care
- Increasing number of PID episodes
- Severity of infection

Infertility
- 1 episode – 15%
- 2 episodes – 35%
- 3 or more – 75%

Ectopic pregnancy
- increased 6- to 10-fold

- May be up to 10%
Chronic pelvic pain (15-20%)
Recurrent infection (20-25%)
Abscess (5-15%)

Ovarian Cancer
- Lin HW et al in 2011
- Seidman JD et al in 2002
- Risch HA et al in 1995
Treatment – Where to treat?

Adolescents
Drug addicts
Severe disease
Suspected abscess
Uncertain diagnosis
Generalized peritonitis
Temperature > 38.3 C
Failed outpatient therapy
Recent intrauterine instrumentation
WBC > 15,000
Nausea/vomiting precluding oral therapy

**BOX 84-2**

**Indications for Inpatient Management of Pelvic Inflammatory Disease**

- A surgical emergency, such as appendicitis, cannot be ruled out.
- The patient is pregnant.
- The patient does not respond clinically to oral antimicrobial therapy.
- The patient is unable to adhere to or tolerate an outpatient oral regimen.
- Severe illness, nausea and vomiting, or high fever is present.
- A tubo-ovarian abscess is present.
Treatment – Outpatient

Ceftriaxone 250 mg IM x once
Cefoxitin 2 g IM with 1 g PO Probenecid x once
Cefotaxime 1 g IM x once
Ceftizoxime 1 g IM x once

PLUS Doxycycline 100 mg PO BID x 14 d

With/without Metronidazole 500 mg PO BID x 14 d
Treatment – Outpatient – PCN Allergy

Give test dose (1/10th) of cephalosporin
Observe for 2 hours
Give the rest of the dose

Severe Allergy
- Inpatient management
- Levofloxacin 500 mg PO Qday x 14 d
- Moxifloxacin 400 mg PO Qday x 14 d

PLUS Doxycycline 100 mg PO BID x 14 d
PLUS Azithromycin 2 g PO x once

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With/without Metronidazole 500 mg PO BID x 14 d
Treatment – Inpatient

Cefotetan 2 g IV Q12 hr
Cefoxitin 2 g IV Q6hr

Clindamycin 900 mg IV Q8hr

Ampicillin/sulbactam 3 g IV Q6hr

PLUS Doxycycline 100 mg PO or IV Q12hr

PLUS Gentamycin
  ◦ Loading dose 2 mg/kg IV or MI
  ◦ Maintenance dose 1.5 mg/kg Q8hr or 3-5 mg/kg/day Q24hr

PLUS Doxycycline 100 mg PO or IV Q12hr
Treatment – Inpatient with TOA

Clindamycin 450 mg PO Q6hr

Metronidazole 500 mg PO Q8hr x 14 days

If not improved in 2-3 days, can modify antimicrobial regimen prior to drainage

Should drain regardless if > 8 cm
Treatment – Follow up

Follow up in 48-72 hours for outpatient
- If no improvement, admit for parenteral treatment

Counselling
- Route of acquisitions for STIs
- Concomitant need for partner treatment
- Future safe sex practices

Other evaluation
- Hepatitis screening
- Serologic testing for syphilis
- HIV screening
- HPV vaccination
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Resources


UpToDate
- PID: Pathogenesis, microbiology and risk factors
- PID: Clinical manifestations and diagnosis
- PID: Treatment
- PID: Long-term complications of PID

ACOG – CO 645 – Dual Therapy for Gonococcal Infections
ACOG – PB 174 – Evaluation and Management of Adnexal Masses
Questions?