Pelvic Inflamatory Disease

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INTRODUCTION

- Pelvic inflammatory disease (PID) refers to acute and subclinical infection of the upper genital tract in women, involving any or all of the uterus, fallopian tubes, and ovaries;
- this is often accompanied by involvement of the neighboring pelvic organs.
- It results in endometritis, salpingitis, oophoritis, peritonitis, perihepatitis, and/or tubo-ovarian abscess.

- The majority of PID cases (85 percent) are caused by sexually transmitted pathogens or bacterial vaginosis-associated pathogens.
- Fewer than 15 percent of acute PID cases are not sexually transmitted and instead are associated with enteric (eg, *Escherichia coli, Bacteroides fragilis*, Group B streptococci, and *Campylobacter* spp) or respiratory pathogens (eg, *Haemophilus influenzae*, *Streptococcus pneumoniae*, Group A streptococci, and *Staphylococcus aureus*) that have colonized the lower genital tract [1].
- Post-operative pelvic cellulitis and abscess, pregnancy-related pelvic infection, injury or trauma-related pelvic infection, and pelvic infection secondary to spread of another infection (eg, appendicitis, diverticulitis, tumor) can also produce a very similar clinical picture.
- However, the etiologic differences among these processes, principally in that they are not caused by a sexually transmitted infection (STI), have significant implications for treatment and prevention.

MICROBIOLOGY

- The most commonly identified pathogens in pelvic inflammatory disease (PID) among sexually active pre-menopausal females.
  - *Neisseria gonorrhoeae* and
  - *Chlamydia trachomatis*
- In the pre-menopausal group
  - *Mycoplasma genitalium,*. Is a rare agent.
- In post-menopausal women
  - *E. coli* and colonic anaerobes
- Very rare pathogens identified include
  - *Mycobacterium tuberculosis*
  - The agents of Actinomycosis.
- However, in most cases, the precise microbial etiology of PID is unknown. Regardless of the initiating pathogen, PID is clinically considered a mixed infection.
- Up to 10% of women with untreated gonorrhea and 20% of women with untreated chlamydia infection may go on to develop PID.

CLINICAL FEATURES

Patients at risk

- Any sexually active female is at risk for sexually transmitted infection (STI) associated pelvic inflammatory disease (PID),
  - Multiple sexual partners are at the highest risk.
  - Age younger than 25,
  - A partner with a sexually transmitted infection,
  - A history of prior PID or a STD.
- The use of barrier contraception is protective.
- Rare to have PID during pregnancy because the mucus plug and decidua seal off the uterus from ascending bacteria, PID can occur in the first 12 weeks of gestation before this occurs.
- Women who undergo instrumentation of the cervix are at higher risk of infection ascending to cause PID.
- Older women less commonly present with PID, but when they do, the cause is more likely to be non-STI-related.

Spectrum of disease

- The term PID encompasses a wide spectrum of clinical presentations.
- The time course of presentation is typically acute over several days, but a more indolent presentation over weeks to months can also occur.
- Some women do not present to care with symptoms of PID but are later suspected to have had it because of tubal factor infertility.
- Even acute symptomatic PID represents a spectrum of clinical disease, from mild, vague pelvic symptoms to tubo-ovarian abscess and, rarely, fatal intra-abdominal sepsis.
- In some women, the inflammatory process can extend to the liver capsule to cause perihepatitis (the Fitz-Hugh Curtis syndrome).

Acute symptomatic PID

- Characterized by the acute onset of
  - lower abdominal or pelvic pain,
    - Is the cardinal presenting symptom in women with PID.
    - The abdominal pain is usually bilateral and rarely of more than two weeks' duration.
    - The character of the pain is variable, and in some cases, may be quite subtle.
    - The recent onset of pain that worsens during coitus or with jarring movement may be the only presenting symptom of PID.
    - The onset of pain during or shortly after menses is particularly suggestive.
  - Pelvic organ tenderness, and
  - Evidence of inflammation of the genital tract.
- The findings can be subtle and nonspecific.
- The majority of women with PID have mild to moderate disease and only a minority develop peritonitis or pelvic abscess,
- Abnormal uterine bleeding (post-coital bleeding, inter-menstrual bleeding, menorrhagia) occurs in one-third or more of patients with PID.
- Other non-specific complaints include urinary frequency and abnormal vaginal discharge.

Examination findings

- Abdominal tenderness on palpation,
  - Commonest finding,
  - Greatest in the lower quadrants, which may or may not be symmetrical.
- In women with severe PID:
  - Rebound tenderness,
  - Fever,
  - Decreased bowel sounds
- The defining characteristic of acute symptomatic PID
  - Uterine, and adnexal tenderness on bimanual pelvic examination.
- Purulent endocervical discharge and/or vaginal discharge is also common.

Laboratory findings

- Most laboratory findings in PID are
  - Nonspecific.
  - Rare.
- Peripheral blood leukocytosis.
- Elevated erythrocyte sedimentation rate (ESR)
- Elevated C-reactive protein (CRP).

Perihepatitis

- Fitz-Hugh Curtis Syndrome
- PID with inflammation of the liver capsule and peritoneal surfaces of the anterior right upper quadrant.
- There is generally minimal stromal hepatic involvement.
- It occurs in approximately 10 percent of women with acute PID
- Is characterized by right upper quadrant abdominal pain
- Distinct pleuritic component, sometimes referred to the right shoulder.
- Marked tenderness in the right upper quadrant.
- The severity of the pain in this location may mask the diagnosis of PID and lead to concerns regarding cholecystitis.
- Aminotransferases are usually normal or only slightly elevated.
- On laparoscopy or visual inspection, perihepatitis manifests as a patchy purulent and fibrinous exudate ("violin string" adhesions), most prominently affecting the anterior surfaces of the liver (not the liver parenchyma).
- The syndrome was first associated with
  - Gonococcal salpingitis
  - *C. trachomatis*.

Fitz-Hugh-Curtis syndrome

- Complication of **pelvic inflammatory disease (PID)**
- **Perihepatitis**
- Inflammation of **hepatic capsule** & **diaphragm**
- **Pleuritic** chest pain
- **May or may not** have signs/symptoms of PID

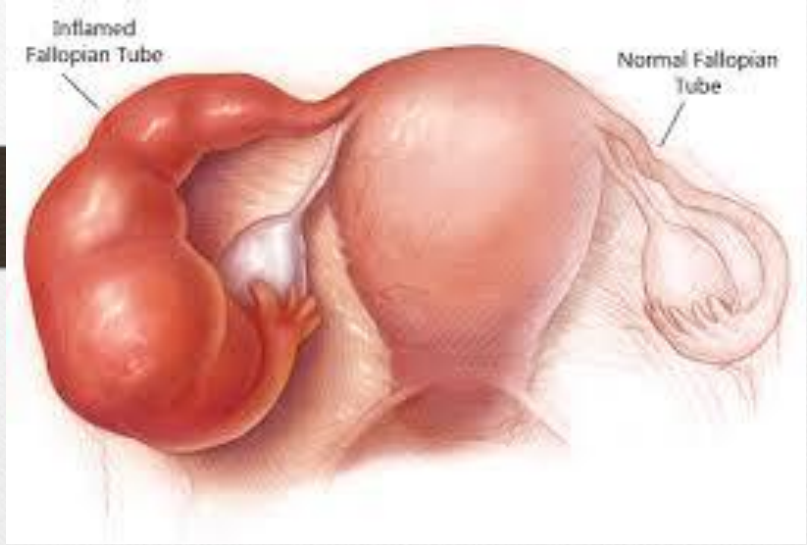
Violin string sign
Adhesions b/w liver and abdominal wall

Liver

Abdominal wall

Tubo-ovarian abscess

- An inflammatory mass involving the
  - Fallopian tube,
  - Ovary, and, occasionally,
  - Other adjacent pelvic organs.
- Women with a tubo-ovarian abscess may have a palpable adnexal mass on examination.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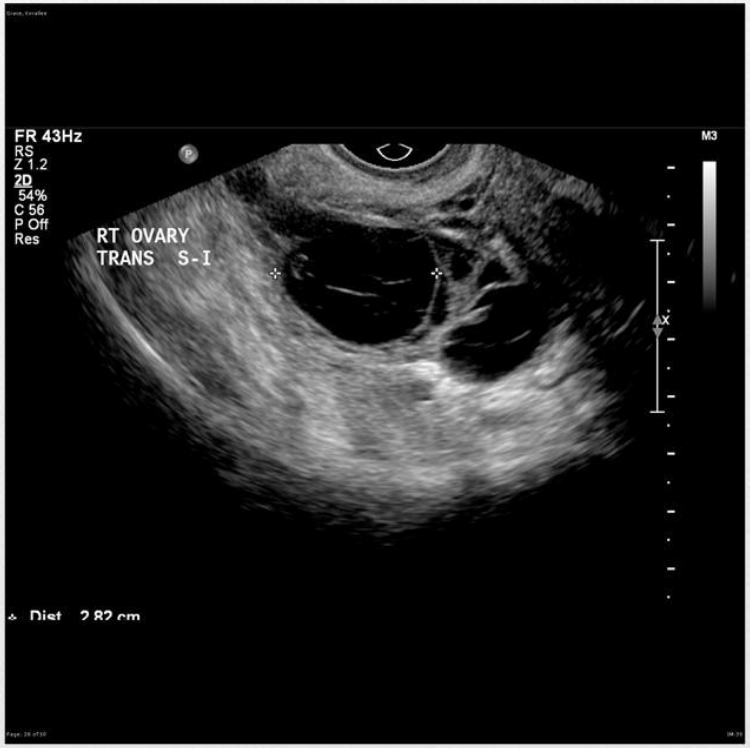
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Subclinical PID

- Subclinical infection of the upper reproductive tract that does not prompt a woman to present to medical care but is severe enough to produce significant sequelae appears to be relatively common.
- Women with tubal factor infertility that appears likely to have been a result of past episodes of PID often give no history of PID.
- Previously undiagnosed PID has also been identified in women with a history of previous mild symptoms, but with an endometrial biopsy that demonstrates excess neutrophils and plasma cells, consistent with inflammation and PID.
- Lower genital tract infection with gonorrhea, chlamydia, or bacterial vaginosis is a risk factor for this finding.
    - As an example, in a study that included 562 women at risk for but without clinical findings suggestive of PID, 13 percent of them had endometritis on endometrial biopsy, and rates of cervical *C. trachomatis* isolation were similar to women with clinically evident PID.
- Subclinical episodes of PID may occur more frequently in oral contraceptive users.

Chronic PID

- An indolent presentation of PID with low-grade fever, weight loss, and abdominal pain has been reported with actinomycosis and tuberculosis.
- An association between an indwelling IUD and risk of actinomycosis has been suggested, although this relationship remains unclear.

Eevaluation

In the west

- PID should be suspected in any young or sexually active female patient who presents with lower abdominal pain and pelvic discomfort.
- The index of suspicion for PID should be high, especially in adolescents.
- The goal of the initial evaluation of women with suspected PID is to
  - Establish a presumptive clinical diagnosis of PID,
  - Assess for additional findings that increase the likelihood of the diagnosis,
  - Evaluate for other potential causes of pelvic pain.
- A presumptive clinical diagnosis of PID can be made on the basis of history and physical exam findings alone.
- Although laboratory testing is also done at the initial evaluation of all patients with suspected PID, empiric treatment should not be delayed while awaiting results of these supportive tests.
- For women who are acutely ill and may have complications of PID, who do not improve with empiric therapy for PID, or in whom the diagnosis remains uncertain, additional diagnostic tests, such as pelvic imaging, can be useful.

History

- The history should focus on potential risk factors for PID.
  - In particular, a sexual history should be taken, assessing for new sexual partners and consistent use of condoms.
- Characters of symptoms:
  - The onset (usually recent)
  - Character of pelvic pain (usually constant and aching),
- Subtle and mild symptoms can be consistent with PID.
- Other symptoms of the differential diagnosis.

Physical and pelvic exam

- Bimanual exam to evaluate for cervical motion, uterine, or adnexal tenderness.
- Speculum exam should be performed to evaluate for cervical mucopurulent discharge.
- Pelvic organ tenderness is the defining characteristic of acute symptomatic PID.
- Other diagnoses should also be considered if uterine and adnexal tenderness are not prominent.
- The presence of a palpable adnexal mass may suggest a tubo-ovarian abscess complicating PID, but it could also reflect other disease processes in the differential diagnosis of PID.

Point-of-care and laboratory tests

- The following tests should be performed for all women suspected of having PID:
  - Pregnancy test
  - Microscopy of vaginal discharge (where available)
  - Nucleic acid amplification tests (NAATs) for *C. trachomatis* and *N. gonorrhoeae*
  - HIV screening
  - Serologic testing for syphilis

- A pregnancy test to rule out ectopic pregnancy and complications of an intrauterine pregnancy.
- Saline microscopy of vaginal discharge is to assess for increased white blood cells (WBC) in vaginal fluid which is sensitive for PID.
- Microscopy can also identify coexisting bacterial vaginosis and trichomoniasis.
- Positive NAATs for *C. trachomatis* or *N. gonorrhoeae* support the diagnosis of PID, but negative NAATs do not rule out PID.
- HIV and syphilis testing are to evaluate for other sexually transmitted infections that share similar risk factors with PID.

- A complete blood count, erythrocyte sedimentation rate, and C-reactive protein are often obtained in patients seen in hospital-based settings who have more severe clinical presentations, including fever, and may warrant inpatient therapy .

Imaging techniques

- Pelvic imaging can help evaluate for alternative causes of pelvic pain or complications of PID (such as a tubo-ovarian abscess).
- However, the absence of radiographic findings consistent with PID does not rule out the possibility of PID and should not be a reason to forgo or delay therapy for presumptive PID.
- Ultrasound is the imaging technique that has been most studied for the evaluation of PID.
- There is limited evidence for the use of CT or magnetic resonance imaging (MRI) in women with suspected PID; however, they are useful to exclude alternative diagnoses in women with an atypical and severe presentation.
- When a tubo-ovarian abscess is present, a complex thick-walled, multilocular cystic collection can be seen in the adnexa, typically with internal echoes or multiple fluid levels.

Laparoscopy

- Despite its value in confirming a diagnosis of PID, laparoscopy is not sensitive enough to be considered the diagnostic gold standard.
- The specificity of laparoscopy is high, but its sensitivity is as low as 50 percent .
- It is an invasive procedure, particularly for a condition that does not typically warrant surgical intervention.
- Laparoscopy can be a useful part of the diagnostic workup for PID when imaging studies have not been definitively informative in the following situations:
  - In a patient who has failed outpatient treatment for PID, to look for alternative causes of the patient's symptoms
  - In a patient whose symptoms are not clearly improving or worsening after approximately 72 hours of inpatient treatment for PID, which suggests that PID may not be the correct diagnosis
  - In addition, some surgeons may proceed directly to laparoscopy in an acutely ill patient with a high suspicion of a competing diagnosis that would be diagnosed and intervened on through laparoscopy (eg, appendicitis).
- Consent for laparotomy at the same procedure should be obtained in advance for these patients.

Transcervical endometrial biopsy

- This can be used to detect endometritis, which is associated with salpingitis.
- However, it is not used routinely because
  - The correlation is not 100 percent,
  - There is a delay associated with processing the biopsy
  - There is inter-individual variation when interpreting the histology due to the patchy nature of the inflammation, thus limiting consistency.

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

Treatment

- Indications for hospitalization include: pregnancy, nausea and vomiting, severe clinical illness (fevers, chills, severe abdominal pain), suspected pelvic abscess, or a possible a
- Treatment of pelvic inflammatory disease requires broad antimicrobial coverage against the likely pathogens, including *Neisseria gonorrhoeae*, *Chlamydia trachomatis*, and the gram-negative and gram-positive organisms that comprise the cervical and vaginal flora. Additional anaerobic coverage may be important among patients with severe or complicated PID. There are multiple potential antibiotic regimens that are suitable for such broad spectrum coverage with proven efficacy in the treatment of PID.lternative diagnosis (eg, appendicitis).

Anti-Microbials

- Severe or complicated PID,
  - In-Patient
  - Second generation cephalosporin (eg, cefoxitin 2 gintravenously every 6 hours or cefotetan 2 g IV every 12 hours) combined with
  - Doxycycline (100 mg orally every 12 hours).
  - Another option is
  - Clindamycin (900 mg intravenously every eight hours) plus
  - Gentamicin (2 mg/kg loading dose followed by a 1.5 mg/kg maintenance dose every eight hours).
    - Single daily intravenous dosing of gentamicin may be substituted for three times daily dosing.
- Transitioning from parenteral to oral therapy (doxycycline 100 mg twice daily alone) can usually be started after 24 hours of sustained clinical improvement.
- Mild or moderate PID,
  - Out patient.
  - Ceftriaxone (250 mg intramuscularly in a single dose) plus
  - Doxycycline (100 mg orally twice a day for 14 days).
  - Addition Metronidazole (500 mg orally twice a day for 14 days) for those with a history of gynecological instrumentation in the preceding two to three weeks.
- The optimal duration of therapy is 14 days.
- Patients receiving outpatient therapy should be carefully evaluated for clinical improvement within 72 hours.
- Male sex partners of women with PID should be examined and treated if they had sexual contact with the patient during the previous 60 days prior to the patient's onset of symptoms to decrease the risk of reinfection.