Pelvic Inflammatory Disease

How to Recognize and Treat

While rates of pelvic inflammatory disease (PID) have declined, PID and its potential complications still affect many women in the United States. Patients may present with vague or no symptoms, so clinicians must maintain a high level of suspicion and proactively offer screening for sexually transmitted infections to at-risk patients.

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IN THIS ARTICLE

Pelvic inflammatory disease (PID) is an ascending polymicrobial infection of the female upper reproductive tract that primarily affects sexually active women ages 15 to 29. Around 5% of sexually active women in the United States were treated for PID from 2011-2013.[1] The rates and severity of PID have declined in North America and Western Europe due to overall decrease in sexually transmitted infection (STI) rates, improved screening initiatives for *Chlamydia trachomatis*, better treatment compliance secondary to increased access to antibiotics, and diagnostic tests with higher sensitivity.[2] Despite this rate reduction, PID remains a major public health concern given the significant long-term complications, which include infertility, ectopic pregnancy, and chronic pelvic pain.[3]

EPIDEMIOLOGY AND PATHOGENESIS

PID is caused by sexually transmitted bacteria or enteric organisms that have spread to internal reproductive organs. Historically, the two most common pathogens identified in cases of PID have been *Chlamydia trachomatis* and *Neisseria gonorrhoeae*; however, the decline in rates of gonorrhea has led to a diminished role for *N gonorrhoeae* (though it continues to be associated with more severe cases).[4,5]

More recent studies have suggested a shift in the causative organisms; less than half of women diagnosed with acute PID test positive for either *N gonorrhoeae* or *C trachomatis*.[6] Emerging infectious agents associated with PID include *Mycoplasma genitalium*, *Gardnerella vaginalis*, and bacterial vaginosis–associated bacteria.[5,7,8-10]

RISK FACTORS

Women ages 15 to 25 are at an increased risk for PID. The high prevalence in this age group may be attributable to high-risk behaviors, including a high number of sexual partners, high frequency of new sexual partners, and engagement in sexual intercourse without condoms.[11]

Taking an accurate sexual history is imperative. Clinicians should maintain a high level of suspicion for PID in women with a history of the disease, as 25% will experience recurrence.[12]

Clinicians should not be deterred from screening for STIs and cervical cancer in women who report having sex with other women. In addition, transgender patients should be assessed for STIs and HIV-related risks based on current anatomy sexual practices.[13]

PHYSICAL EXAM

While some cases of PID are asymptomatic, the typical presentation includes bilateral abdominal pain and/or pelvic pain, with onset during or shortly after menses. The pain often worsens with movement and co-

Credit: Brian Evans / Science Source

itus. Associated signs and symptoms include abnormal uterine bleeding or vaginal discharge; dysuria; fever and chills; frequent urination; lower back pain; and nausea and/or vomiting.[14,15]

All females suspected of having PID should undergo both a bimanual exam and a speculum exam. On bimanual examination, adnexal tenderness has the highest sensitivity (93% to 95.5%) for ruling out acute PID, whereas on speculum exam, purulent endocervical discharge has the highest specificity (93%).[16,17] Bimanual exam findings suggestive of PID include cervical motion tenderness, uterine tenderness, and/or adnexal tenderness. Suggestive speculum exam findings include abnormal discoloration or texture of the cervix and/or endocervical mucopurulent discharge.[5,16,17]

One cardinal rule that should not be overlooked is that all females of reproductive age who present with abdominal pain and/or pelvic pain should take a pregnancy test to rule out ectopic pregnancy and any other pregnancy-related complications.

DIAGNOSIS

The diagnosis of PID relies on clinical judgement and a high index of suspicion.[5,18] The CDC's diagnostic criteria for acute PID include

- Sexually active female **AND**
- Pelvic or lower abdominal pain **AND**
- Cervical motion tenderness **OR** uterine tenderness **OR** adnexal tenderness.[5]

Additional findings that support the diagnosis include

- Abnormal cervical mucopurulent discharge or cervical friability
- Abundant white blood cells (WBCs) on saline microscopy of vaginal fluid
- Elevated C-reactive protein
- Elevated erythrocyte sedimentation rate
- Laboratory documentation of infection with *C trachomatis* or *N gonorrhea*
- Oral temperature > 101°F.[5,18]

The CDC notes that the first two findings (mucopurulent discharge and evidence of WBCs on microscopy) occur in most women with PID; in their absence, the diagnosis is unlikely and other sources of pain should be considered.[5] The differential for PID includes acute appendicitis; adhesions; carcinoid tumor; cholecystitis; ectopic pregnancy; endometriosis; inflammatory bowel disease; and ovarian cyst.[19]

Given the variability in presentation, clinicians may find it useful to perform further diagnostic testing. There are additional laboratory tests that may be ordered for patients with a suspected diagnosis of PID (see Table 1, page 34).

TREATMENT

According to the CDC's 2015 treatment guidelines for PID, a negative endocervical exam and negative microbial screening do not rule out an upper reproductive tract infection. Therefore, all sexually active women who present with lower abdominal pain and/or pelvic pain and have evidence of cervical motion, uterine, or adnexal tenderness on bimanual exam should be treated immediately.[5]

Treatment guidelines are outlined in Table 2 (page 35). The polymicrobial nature of PID requires gram-negative antibiotic cov-

TABLE 1
Additional Diagnostic Tests for Pelvic Inflammatory Disease

	Advantages	Disadvantages
Laparoscopy	Specificity 100% Sensitivity 87%	Expensive Invasive
Serological tests	Inexpensive Readily available	Delayed results
Blood tests—WBC, ESR, and CRP	Inexpensive Readily available Rapid results	Nonspecific
Transvaginal ultrasound	Inexpensive Readily available Rapid results	Specificity 60% Sensitivity 30%
CT scan		Not useful in early PID Expensive Radiation exposure
MRI	Specificity 89% Sensitivity 95%	Expensive Not readily available

Abbreviations: CRP, C-reactive protein; ESR, erythrocyte sedimentation rate; WBC, white blood cell.
Sources: Gaitán et al. *Infect Dis Obstet Gynecol.* 2002[17]; Łój et al. *Ann Agric Environ Med.* 2016[27]; Sam et al. *Radiographics.* 2002.[28]

erage, such as doxycycline plus a second/third-generation cephalosporin.[5] Clinicians should note that cefoxitin, a second-generation cephalosporin, is recommended as firstline therapy for inpatients, as it has better anaerobic coverage than ceftriaxone.[19] A targeted change in antibiotic coverage—such as inclusion of a macrolide and/or metronidazole—might be necessary if a causative organism is identified by culture.[7]

Treatment is indicated for all patients with a presumptive diagnosis of PID regardless of symptoms or exam findings, as PID may be asymptomatic and long-term sequelae (eg, infertility, ectopic pregnancy) are often irreversible. At-risk patients include sexually active adolescents, women with multiple sexual partners, women with a history of STI, those whose sexual partner has an STI, and women living in communities with a high prevalence of disease.[20,21]

Women being treated for PID should be advised to abstain from sexual intercourse until symptoms have resolved, treatment is completed, and any sexual partners have been treated as well. It is essential to emphasize to patients (and their partners) the importance of compliance to treatment regimens and the risk for PID co-infection and reinfection, as recurrence leads to an increase in long-term complications.[5]

Treatment of sexual partners. The CDC instructs that a woman's most recent partner should be treated if she had sexual intercourse within 60 days of onset of symptoms or diagnosis. Furthermore, men who have had sexual contact with a woman who has PID in the 60 days prior to onset of her symptoms should be evaluated, tested, and treated for chlamydia and gonorrhea, regardless of the etiology of PID or the pathogens isolated from the woman.[5]

Admission criteria. Hospitalization should be based on provider judgment despite patient age. The suggested admission criteria include surgical emergency (eg, appendicitis), tubo-ovarian abscess, pregnancy, severe illness, nausea and vomiting, high fever, inability to follow or tolerate an outpatient oral regimen, and lack of clinical response to oral antimicrobial therapy.[5]

Follow-up care. Clinical improvement (ie, reduction in abdominal, uterine, adnexal, and cervical motion tenderness) should occur within 72 hours of antimicrobial therapy initiation. If it does not, hospital admission or adjustment in antimicrobial regimen should be considered, as well as additional diagnostic testing (eg, laparoscopy). In addition, all women with chlamydial- or gonococcal-related PID should return in three months for surveillance testing.[22]

COMPLICATIONS

Long-term complications—including infertility, chronic pelvic pain, and ectopic pregnancy—may occur, even when there has been a clinical response to adequate treatment. Data from the PID Evaluation and Clinical Health (PEACH) study were analyzed to assess long-term sequelae at seven years postdiagnosis and treatment. The researchers found that about 21% of women experienced recurrent PID, 19% developed

TABLE 2
CDC Treatment Regimens for PID

Select one of the following	
Parenteral treatment for severe PID	Cefoxitin 2 g IV every 6 h PLUS doxycycline 100 mg bid for 14 d
	Cefotetan 2 g IV every 12 h PLUS doxycycline 100 mg bid for 14 d
	Clindamycin 900 mg IV every 8 h PLUS gentamicin loading dose IV or IM 2 mg/kg, followed by a maintenance dose 1.5 mg/kg every 8 h. Single daily dosing 3-5 mg/kg can be substituted.
Alternative parenteral regimen for severe PID	Ampicillin/Sulbactam 3 g IV every 6 h PLUS doxycycline 100 mg orally or IV every 12 h
Intramuscular/oral regimens for mild to moderate PID	Ceftriaxone 250 mg IM in a single dose PLUS doxycycline 100 mg orally bid for 14 d WITH or WITHOUT metronidazole 500 mg orally bid for 14 d
	Cefoxitin 2 g IM in a single dose and probenecid, 1 g orally administered concurrently in a single dose PLUS doxycycline 100 mg orally bid for 14 d WITH or WITHOUT metronidazole 500 mg orally bid for 14 d
	Other parenteral third-generation cephalosporin (eg, ceftizoxime or cefotaxime) PLUS doxycycline 100 mg orally bid for 14 d WITH or WITHOUT metronidazole 500 mg orally bid for 14 d
Alternative oral regimens for mild to moderate PID	Azithromycin 500 mg IV daily for 1-2 doses, followed by 250 mg orally daily for 12 to 14 d or in combination with metronidazole
	Azithromycin 1 g orally once a wk for 2 wk in combination with ceftriaxone 250 mg IM single dose

Source: CDC.[5]

infertility, and 42% reported chronic pelvic pain.[3] Other research has also shown that repeat episodes of PID and delayed treatment increase the risk for long-term complications.[23,24]

SCREENING AND PREVENTION

Ten percent of women with an untreated STI will go on to develop PID.[4] It is imperative to educate patients on the dangers and consequences of STIs when they become sexually active. Adolescents benefit the most from preventive education; this group is twice as likely as any other age group to be diagnosed with PID due to their inclination toward risky sexual behavior. Additionally, younger women tend to have a more friable cervix, increasing their risk for infection.[25,26] Providers should promote safe sexual practices, such as condom use and less frequent partner exchange, in order to reduce STI exposure.

In 2015, the rate of reported cases of *C trachomatis* was 645.5 per 100,000 females, and of *N gonorrheae,* 107.2 per 100,000 females.[23] The United States Preventive Services Task Force and the CDC recommend annual screening for chlamydia and gonorrhea in all sexually active women younger than 25, as well as sexually active women ages 25 and older who are considered at increased risk.[5]

CONCLUSION

PID is often difficult to diagnose, since patients may be asymptomatic or present with

vague symptoms. Clinicians should maintain a high level of suspicion for PID in adolescent females due to the high incidence of STI exposure in this population. The best way to prevent long-term complications of PID is to prevent the first episode of PID and/or first exposure to STIs. Therefore, clinicians should be proactive in offering STI screenings to all sexually active patients younger than 25 who request care, regardless of their chief complaint, and educating patients on the potential long-term effects of PID and STIs. **CR**

The best way to prevent long-term complications of PID is to prevent the first episode.

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