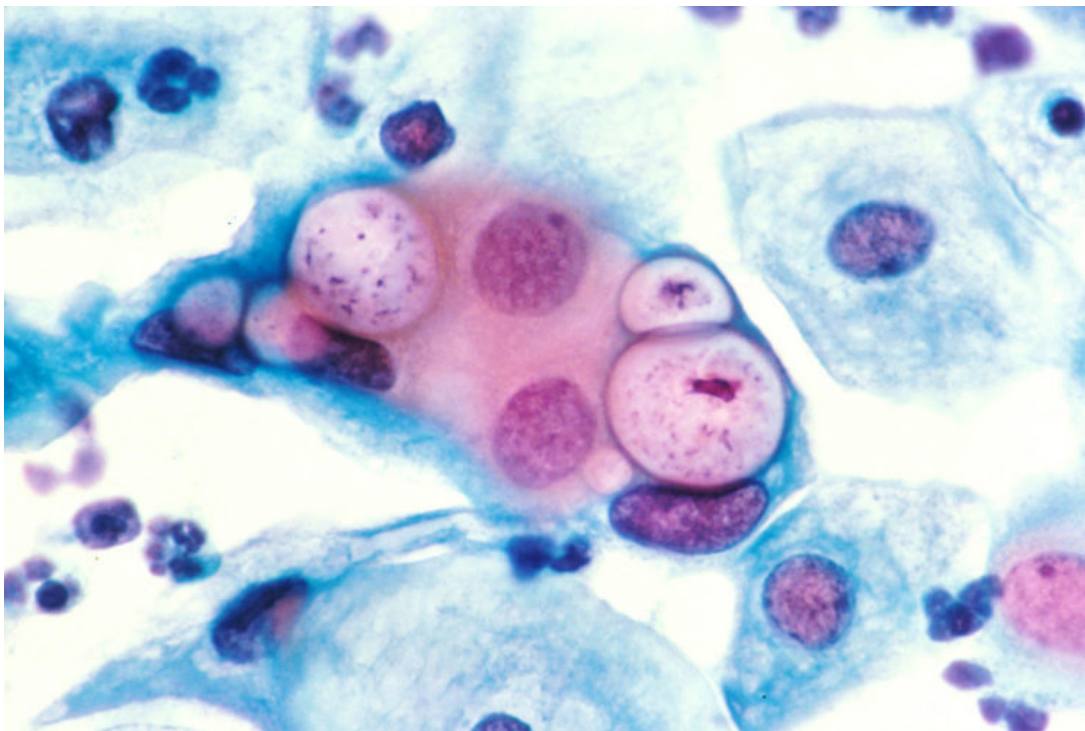


Pelvic Inflammatory Disease (PID, Pelvic Infection) — Diagnosis and Treatment

[See online here](#)

Pelvic inflammatory disease is infectious in etiology and is closely linked to sexually transmitted disease. Pelvic inflammatory disease is common in the United States with an estimated incidence of 2.5 million. The condition can be diagnosed clinically, with lower abdominal pain, cervical motion tenderness, an elevated erythrocyte sedimentation rate and fever. Once diagnosed, the patient should be put on empirical antibiotic therapy that should cover gonorrhea, chlamydia, gram-negative organisms and anaerobes. Patients with complications, such as abscess formation or sepsis, might benefit from laparoscopic surgery.



Definition of Pelvic Inflammatory Disease

Pelvic inflammatory disease (PID) is defined as an **infectious disease of the upper female reproductive system**. This infection usually affects the uterus, fallopian tubes and, in some patients, the ovaries. PID is closely linked with sexually transmitted diseases and the most commonly implicated organisms are chlamydia trachomatis, Neisseria gonorrhoeae, and Gardnerella vaginalis.

Epidemiology of Pelvic Inflammatory Disease

Pelvic inflammatory disease is a common condition in the United States and approximately 2.5 million women develop PID per year. Up to 150,000 patients are hospitalized per year because of PID. Occurs in 40% of women developing endocervicitis from untreated *Neisseria gonorrhoeae* or *Chlamydia trachomatis*.

Pelvic inflammatory disease is more common in women in their reproductive years, usually in their twenties, who are menstruating and who have multiple sexual partners.

Etiology of Pelvic Inflammatory Disease

Pelvic inflammatory disease is an infectious disorder. **Chlamydia trachomatis** and **Neisseria gonorrhoeae** are the two most commonly identified etiological organisms of PID.

Approximately, 20% of women who are untreated for chlamydial and gonorrheal infections will develop PID.

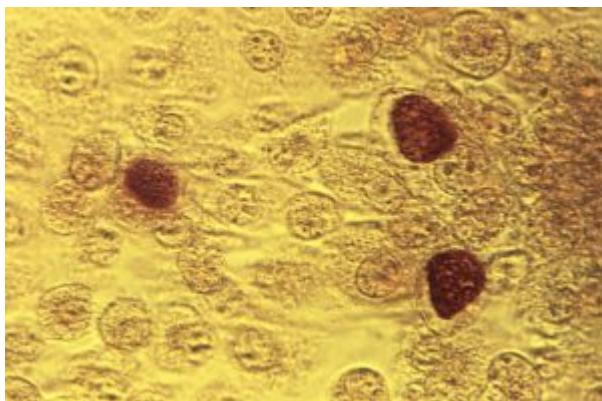


Image: "This photomicrograph reveals McCoy cell monolayers with *Chlamydia trachomatis* inclusion bodies; Magnified 200X." by CDC/Dr. E. Arum; Dr. N. Jacobs - This media comes from the Centers for Disease Control and Prevention's Public Health Image Library (PHIL), with identification number #3802. License: Public Domain

While the etiology is usually a sexually transmitted disease, **polymicrobial infections** are commonly identified in culture studies. Anaerobes are commonly found in addition to gonorrhea or chlamydia organisms. **Viral infections** can also complicate PID and they include **herpes simplex type 2** and **cytomegalovirus**.

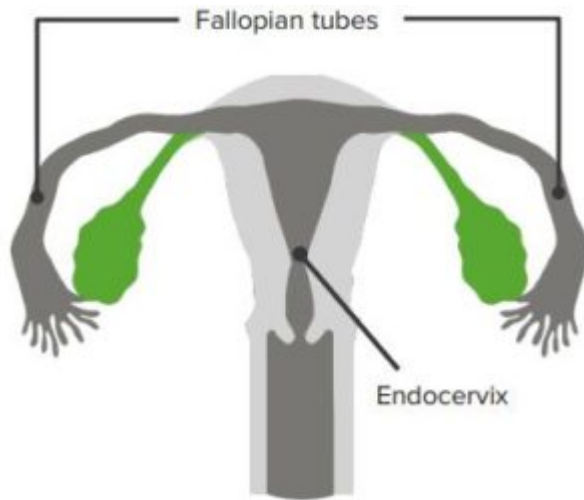
Several risk factors have been linked to PID. **Multiple sexual partners** and a **previous history of sexually transmitted infections** are the most common risk factors for PID, followed by a previous history of an **invasive gynecological procedure** such as an endometrial biopsy. **Intrauterine devices for contraception** have been linked to a 9-fold increase in the risk of PID. The bacteria associated with intrauterine devices related PID are anaerobes and not chlamydia or gonorrhea.

Pathophysiology of Pelvic Inflammatory Disease

PID occurs in **two subsequent steps** or stages. At first, the patient develops a sexually transmitted infection that is usually chlamydial and **asymptomatic**. After a while, the cervical mucosal barrier gets disrupted either due to normal menstruation cycle, use of

oral contraceptive pills, or changes induced by the ongoing infection.

The bacterial infection would then ascend to the upper genital tract and involve the uterus, fallopian tubes or other adjacent structures and inflammation can occur. Once at this stage, the patients become symptomatic.



"Pathology Pelvic Inflammatory Disease" Image created by Lecturio

Having multiple sexual partners puts the patient at a higher risk of acquiring a sexually transmitted disease. Intercourse and uterine orgasmic contractions facilitate the ascent of the offending organism to the upper genital tract and can contribute to the development of PID in this group of patients.

Finally, **certain genetic polymorphisms**, especially in the toll-like receptors, have been associated with an increased risk of PID due to altered immunity against chlamydial infections.

Clinical Presentation of Pelvic Inflammatory Disease

Patients, if symptomatic, usually present with a fever, nausea, vomiting and pelvic and abdominal pain. Several clues exist that can make the physician suspect pelvic inflammatory disease as the etiology of abdominal pain in a young female patient, which include multiple sexual partners, a recent history of a sexually transmitted infection or the use of an intrauterine device for contraception.

Patients usually present during their menstruation, another clue towards PID as the cause of abdominal pain.

Pelvic pain is exacerbated by intercourse, motion or exercise. PID, if untreated, can lead to **intraabdominal abscess formation** or **infertility**, hence the threshold to diagnose PID should be low. Accordingly, any patient who presents with the above picture should undergo an abdominal and pelvic examination looking for any of the following three signs:

- Cervical motion tenderness
- Uterine tenderness
- Adnexal tenderness.

Laboratory investigations increase the certainty of the diagnosis.

Diagnostic Work-up for Pelvic Inflammatory Disease

The threshold to diagnose PID should be low to avoid possible complications, yet several diagnostic workup studies have been evaluated to improve the certainty of the diagnosis.

Laparoscopic confirmation of the diagnosis is not indicated but is very helpful when in doubt. The diagnosis, however, should be based on clinical, laboratory and imaging studies, and not on laparoscopic evaluation.

Currently, the following criteria are suggested to diagnose PID in a woman presenting with abdominal pain in the pelvic area:

- Oral temperature above 38.3 C
- Abnormal cervical or vaginal discharge
- White blood cells on microscopic examination of the vaginal discharge
- Elevated erythrocyte sedimentation rate and c-reactive protein level
- Laboratory confirmation of chlamydia or Neisseria gonorrhoea infection by DNA.

The presence of fever, lower abdominal pain, vaginal discharge, and a high erythrocyte sedimentation rate is usually enough, and the other criteria are only there to increase the certainty.

Laboratory investigations are needed to exclude other differential diagnoses and to confirm the diagnosis. The presence of **more than 10 white blood cells per high-power field** on microscopic examination of the vaginal secretions is a good diagnostic criterion for PID. Additionally, the detection of **chlamydia or gonorrhoea DNA** or culture studies can be helpful in increasing certainty.

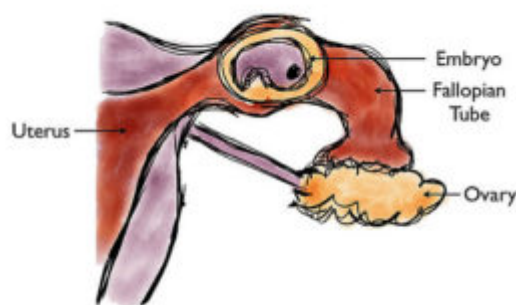


Image: "This is a diagram of an ectopic pregnancy, showing the fetus in the fallopian tube." by Takatakatakumi - Own work.
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Leukocytosis is found in about 50% of the patients but is not necessary for the diagnosis of PID. PID is an inflammatory condition and erythrocyte sedimentation rate, or c-reactive protein levels are expected to be high.

When the clinical and laboratory results are not conclusive, **transvaginal ultrasonography** is indicated. Transvaginal ultrasonography can reveal a thickened fallopian tube, free pelvic fluid or indistinct endometrial borders in PID. Ultrasonography is also helpful in the exclusion of other diagnoses, such as an **abscess** or **ectopic**

pregnancy.

A **computerized tomography (CT) scan** of the abdomen and pelvic regions is indicated in toxic patients to exclude possible complications such as **intraabdominal abscesses**.

A **magnetic resonance imaging (MRI)** is rarely used in PID but, if used, one could see hydrosalpinx and fallopian wall increased thickness.

Treatment of Pelvic Inflammatory Disease

In addition to symptomatic treatment, the bacterial infection responsible for PID should be the target of the treatment with the goal of avoiding PID long-term complications such as chronic pelvic pain, increased risk of ectopic pregnancy and **infertility**.

A low threshold to diagnose and start treatment for PID is essential to avoid complications. The current treatment regimens include **antibiotics**, possible surgical intervention with or without reproductive conservation.

Empiric antibiotic treatment should cover chlamydia, gonorrhea, anaerobes, **gram-negative organisms** and streptococci.

Patients with PID can be treated as outpatients or inpatients depending on the severity of the condition. For outpatient treatment, patients can receive two possible combinations of antibiotics. **Ceftriaxone, doxycycline**, and **metronidazole** are known as regimen A, while **cefoxitin, doxycycline**, and **metronidazole** are considered as regimen B and both are effective in the eradication of the infection in PID.

For inpatient treatment, patients are put on cefoxitin and doxycycline intravenously for 24 hours after the first clinical improvement, and then the patient is switched on doxycycline orally twice a day for two weeks. Patients with an established diagnosis of abscess benefit from metronidazole or clindamycin as anaerobes are more likely to be implicated.

Overview:

Outpatient treatment	Inpatient treatment	Disposition
<ul style="list-style-type: none"> • Ceftriaxone 250 mg IM PLUS Doxycycline 100 mg PO BID x 14 days • If concern for anaerobic cause consider adding Metronidazole 	<ul style="list-style-type: none"> • Cefotetan PLUS Doxycycline • Or Cefoxitin PLUS Doxycycline 	<ul style="list-style-type: none"> • Most outpatient care Admit: <ul style="list-style-type: none"> • Pregnant • Tubo-ovarian abscess • Intractable vomiting • No response to oral medication

Another possible and acceptable regimen for inpatient treatment includes **clindamycin IV** and **gentamicin IV**. Like the previous inpatient treatment, 24 hours after clinical improvement, the patient should start taking doxycycline orally for two weeks.

Antibiotic treatment is sufficient in up to 75% of the cases. Surgical treatment for PID includes simple **drainage of pelvic and fallopian tube fluid, abscess drainage, adhesiolysis** when adhesions form, and **saline irrigation of the pelvic organs**. These procedures can be performed by laparoscopy which can also confirm the diagnosis of PID. Intrauterine devices for contraception are not necessarily needed to be removed if the patient develops PID. Surgical treatment is needed in approximately 20% of the cases.

References

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[Pelvic Inflammatory Disease Treatment & Management](#) via medscape.com

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[Pelvic inflammatory disease: etiology, diagnosis, and treatment.](#) via nih.gov

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