

## Pelvic Inflammatory Disease

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### ABSTRACT

**Introduction:** Pelvic inflammatory diseases (PID) is caused by infections in the female reproductive tract that includes pelvic peritoneum, ovaries, fallopian tubes, and the endometrium. These infections are commonly caused by *Chlamydia trachomatis*, *Neisseria gonorrhoea*, or other sexually transmitted infections. 800,000 women get a diagnosis of pelvic inflammatory disease annually in the United States. PID usually causes irreversible damage to the reproductive tract, and treatment mainly depends on preventing further scarring or complications. Immediate broad spectrum antibiotics are indicated. Treatment can include hospitalization as well as surgery.

**Methodology:** We conducted this review using a comprehensive search of MEDLINE, PubMed, and EMBASE, from January 1985 to February 2017. The following search terms were used: pelvic inflammatory diseases, pathogens causing pelvic inflammatory diseases, causes of infertility, treatment and diagnosis of pelvic inflammatory diseases. **Aim:** In this review, we aim to study the pathophysiology and etiology of pelvic inflammatory diseases, as well as to study the diagnosis, treatment, and possible complications of this condition.

**Conclusion:** It is essential to raise the awareness and knowledge of females in general regarding PID and its symptoms, as early detection will significantly decrease the likelihood of severe complications. Other than infertility, complications of pelvic inflammatory disease include chronic pain. More research is needed in this field to improve management and care of patients suffering from this condition.

**Keywords:** pelvic inflammatory diseases, women health, infertility, sexual health awareness, pathogens pelvic inflammatory diseases.

### INTRODUCTION

More than eight hundreds thousands women get a diagnosis of pelvic inflammatory disease (PID) annually in the United States. According to the Centers for Disease Control and Prevention (CDC), when considering missed PID cases, the number of cases can reach up to a million a year. The serious complications of PID make these rates of a huge concern. These complications include ectopic pregnancy, chronic pelvic pain (CPP), and tubal infertility<sup>[1]</sup>.

The rate of complication increases in insufficiently treated PID cases or if treatment is missed. A recent study reported that most young women expressed their willingness to give up two years of their life to prevent PID and its complications, thus, making this disease an essential concern affecting the quality of life significantly<sup>[2]</sup>.

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*Chlamydia trachomatis*, *Neisseria gonorrhoea*, or other sexually transmitted infections (STIs).

Due to the various clinical manifestations, it is not easy to make a diagnosis of PID. Many PID are asymptomatic with subclinical PID; which is defined as the presence of an inflammation in the upper female reproductive tract, without the presence of any signs and symptoms. Patients with severe disease can present with a severe abdominal pain that may require surgery to resolve. Guidelines published by CDC in 2015 concluded that PID treatment should be considered in any female with lower pain with no obvious cause, and at least one of the following criteria: tender uterus, tender cervix, and tender adnexa<sup>[3]</sup>.

### METHODOLOGY

#### • Data Sources and Search terms

We conducted this review using a comprehensive search of MEDLINE, PubMed, and EMBASE, from January 1985, through February 2017. The

following search terms were used: pelvic inflammatory diseases, pathogens causing pelvic inflammatory diseases, causes of infertility, treatment and diagnosis of pelvic inflammatory diseases

- **Data Extraction**

Two reviewers have independently reviewed the studies, abstracted data, and disagreements were resolved by consensus. Studies were evaluated for quality and a review protocol was followed throughout.

**The study was done after approval of ethical board of Umm Alqura university.**

## **PATHOGENESIS**

Pelvic peritonitis, tubo-ovarian abscesses, salpingitis, endometritis, and other disorders are all included in the definition of the term PID. These disorders occur when an organism moves to the upper reproductive tract from the lower tract (vagina/cervix). PID has a polymicrobial etiology, with many organisms accused like STIs, enteric organisms, and genital flora. However, PID rarely affects women with no sexual activity, and thus is considered a sexually transmitted infection. It is well established that *C trachomatis* and *N. gonorrhoea* play an essential role in the progression of PID. However, recent data have demonstrated that about 70% of PID cases are caused by neither *C trachomatis* nor *N. gonorrhoea* <sup>[4]</sup>.

Other organisms that have been linked to PID and tubal infertility include *Ureaplasma urealyticum*, *Mycoplasma genitalium*, *Actinomyces israelii*, *Prevotella bivia*, *Gardnerella vaginalis*, *campylobacter fetus*, group B-D streptococci, *Bacteroides* species, *Peptostreptococcus* species, *Escherichia coli*, *staphylococci*, group A streptococcus, *Hemophilus influenza*, and *Streptococcus pneumonia*. Usually, peritonitis and abscesses are late complications that result from facultative and anaerobic organisms that cause infections concurrently with an STI <sup>[5]</sup>.

Ascending of organisms from the lower to the upper reproductive tract is associated with frequent sexual intercourse, the presence of bacteria in the semen (bacteriospermia), a history of surgical procedures (either therapeutic or diagnostic) that can cause a disturbance of the normal barrier (like intrauterine device [IUD] insertion, hysterosalpingogram, and/or abortion), poor hygiene, and bacterial vaginosis. Females on

hormonal contraception are usually at a low risk for PID development. This is thought to be a result of hormones on the cervical mucus, and myometrial contractions. About 12% of PID cases are related to surgery <sup>[6]</sup>.

## **DIAGNOSIS**

### **Signs and Symptoms**

Recently, it has been recommended to use laparoscopy or other surgical procedures in the diagnosis and assessment of PID, and to rely on clinical presentation to proceed with proper management.

Unfortunately, classic PID presentation is not always encountered, making the situation relatively hard. A patient presenting with an acute abdominal pain with no apparent explanation should raise the attention to a diagnosis of PID. This variation in presentation and severity of the disease may be attributed to the heterogeneity of infectious agents that cause PID. Infertility is a significant complication that results from long-term PID, and can sometimes be found in women who had an asymptomatic PID <sup>[7]</sup>.

Tubal infertility is commonly present among females who seek infertility services, and report a history of an unexplained pain in the past. This raises the importance of detecting asymptomatic or mild PID, and to thoroughly assess mild non-specific symptoms among sexually active females <sup>[8]</sup>.

To increase sensitivity of clinical examination in diagnosing PID, diagnostic criteria have broadened over time, with current guidelines that recommend the empiric treatment of PID for any sexually active female who presents with unexplained lower pain, and has a high risk of an STI. Other criteria that support the diagnosis include mucopurulent discharge from the cervix or the vagina, saline microscopy showing leukocytes, elevated C-RP or ESR, and a prior history of *C trachomatis* or *N. gonorrhoeae* infection <sup>[3]</sup>.

### **Investigations**

Broad laboratory evaluation should be performed to detect any possible factors that may relate to the clinical condition. Asymptomatic patients are also advised to undergo vaginal or urine nucleic acid amplification test (NAAT), which have become extremely easy and feasible. Visualization of the vagina and cervix using a speculum is

essential for a complete examination, and for collecting required specimens. Speculum examination should be followed by an additional bimanual examination<sup>[9]</sup>.

Other important tests include endocervical *N. gonorrhoeae/C trachomatis* screening, urinalysis, urine culture, a pregnancy test, wet prep and KOH prep, and vaginal PH. It is important to rule out pregnancy as a cause of abdominal or pelvic discomfort. CBC, ESR, and C-RP can be used to estimate the severity of the inflammation. The presence of RBCs or leukocytes can be confirmed with a wet prep. Urine culture is important as many patients will present with a concurrent UTI. In some cases, a pelvic sonography can be performed to detect tubo-ovarian abscess, and ectopic pregnancy. Patients with reported sexual abuse or assault concurrent prior to presentation should be immediately managed and treated properly<sup>[10]</sup>.

Endometrial biopsy can be performed to detect possible endometritis. Laparoscopy, MRI, Doppler imaging studies, and/or transvaginal sonography can also be performed. These investigations will help detect free fluid, abscesses, thickenings, or tubal hyperemia. Differential diagnosis of PID can include many possibilities, due to the non-specific clinical symptoms. Therefore, confirming a PID diagnosis, and excluding other conditions may sometimes need several radiologic and laboratory testing<sup>[11]</sup>.

### **PID Related Complications**

On the short term, PID can cause peri-appendicitis and Fitz-Hugh-Curtis syndrome (perihepatitis). It is still unknown how perihepatitis develops, but it is estimated to be present in about 15% of PID cases. It initially presents with moderate to severe right upper quadrant abdominal pain with tenderness, guarding, and mild hepatomegaly. Diagnosis requires chest radiography and abdominal ultrasound. Most cases have normal liver enzymes. PID due to *N. gonorrhoeae* or *C trachomatis* infection is more likely to develop perihepatitis<sup>[12]</sup>.

Acute salpingitis also predisposes to the development of peri-appendicitis. Peri-appendicitis is usually diagnosed incidentally while patients are undergoing other surgeries. A true appendicitis can be ruled out by blood work and CT scan. Ultrasound should also be performed to rule out other ovarian causes like ectopic pregnancy, ovarian torsion, and

tubular abscess, as CT has poor sensitivity in detecting ovarian problems, and may cause unnecessary exposure to radiation. PID patients are also recommended to test for HIV and syphilis as these patients are at high risk of acquiring these infections, while the most feared complication in long term is infertility<sup>[13]</sup>.

### **Treatment**

PID usually causes irreversible damage to the reproductive tract, and treatment mainly depends on preventing further scarring or complications. Immediate broad spectrum antibiotics are indicated. Studies have found that oral and intravenous antibiotics have similar outcomes regarding efficacy in mild to moderate PID cases. Thus it is not recommended to admit patients with moderate PID into hospital. These patients are recommended to receive oral antibiotics in the outpatient setting<sup>[14]</sup>.

Patients who are admitted to the hospital should meet the following criteria: the inability to exclude an emergency, the presence of an abscess, pregnancy, severe symptoms, intolerability to oral regimens, and/or persistent or progressive symptoms despite outpatient treatment<sup>[15]</sup>.

After starting treatment, all patients must be reassessed within 72 hours. Additional assessment is important when patients do not show any improvement in this period. It is also essential to evaluate current and recent male sexual partners for STIs<sup>[16]</sup>.

Recently, there has been a significant raise in the occurrence of multidrug-resistant *N. gonorrhoea*, making the 72-hour assessment essential for deciding further management. These cases tend to be more complex with a complicated treatment plan to achieve improvement<sup>[1]</sup>.

### **CONCLUSION**

PID continues to be a significant important health problem with many severe long term complications. Our review emphasizes on the extent of this disease in the community with possible predisposing factors. We also focused on methods for prevention of long term sequelae especially infertility. It is essential to raise the awareness and knowledge of females in general regarding PID and its symptoms, as early detection will significantly decrease the likelihood of severe complications. Other than infertility, complications of PID include

chronic pain. More research is needed in this field to improve management and care of PID patients.

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