

Pelvic inflammatory disease (PID)

Definition

Pelvic inflammatory disease (PID) is a term used to describe any infection in the lower female reproductive tract that spreads to the upper female reproductive tract. The lower female genital tract consists of the vagina and the cervix. The upper female genital tract consists of the body of the uterus, the fallopian or uterine tubes, and the ovaries.

Description

PID is the most common and the most serious consequence of infection with sexually transmitted diseases (STD) in women. Over one million cases of PID are diagnosed annually in the United States, and it is the most common cause for hospitalization of reproductive-age women. Sexually active women aged 15-25 are at highest risk for developing PID. The disease can also occur, although less frequently, in women having monogamous sexual relationships. The most serious consequences of PID are increased risk of infertility and ectopic pregnancy.

To understand PID, it is helpful to understand the basics of inflammation. Inflammation is the body's response to disease-causing (pathogenic) microorganisms. The affected body part may swell due to accumulation of fluid in the tissue or may become reddened due to an excessive accumulation of blood. A discharge (pus) may be produced that consists of white blood cells and dead tissue. Following inflammation, scar tissue may form by the proliferation of scar-forming cells and is called fibrosis. Adhesions of fibrous tissue form and cause organs or parts of organs to stick together.

PID may be used synonymously with the following terms:

- salpingitis (Inflammation of the fallopian tubes)
- endometritis (Inflammation of the inside lining of the body of the uterus)
- tubo-ovarian abscesses (Abscesses in the tubes and ovaries)
- pelvic peritonitis (Inflammation inside of the abdominal cavity surrounding the female reproductive organs)

Causes and symptoms

A number of factors affect the risk of developing PID. They include:

- Age. The incidence of PID is very high in younger women and decreases as a woman ages.
- Race. The incidence of PID is 8-10 times higher in nonwhites than in whites.
- Socioeconomic status. The higher incidence of PID in women of lower socioeconomic status is due in part to a woman's lack of education and awareness of health and disease and her accessibility to medical care.

- Contraception. Induced abortion, use of an IUD, non-use of barrier contraceptives such as condoms, and frequent douching are all associated with a higher risk of developing PID.
- Lifestyle. High risk behaviors, such as drug and alcohol abuse, early age of first intercourse, number of sexual partners, and smoking all are associated with a higher risk of developing PID.
- Types of sexual practices. Intercourse during menses and frequent intercourse may offer more opportunities for the admission of pathogenic organisms to the inside of the uterus.
- Disease. Sixty to 75% of cases of PID are associated with STDs. A prior episode of PID increases the chances of developing subsequent infections.

The two major causes of STDs are the organisms *Neisseria gonorrhoeae* and *Chlamydia trachomatis*. The main symptom of *N. gonorrhoeae* infection (gonorrhea) is a vaginal discharge of mucus and pus. Sometimes bacteria from the colon normally in the vaginal cavity may travel upward to infect the upper female genital organs, facilitated by the infection with gonorrhea. Infections with *C. trachomatis* and other nongonococcal organisms are more likely to have mild or no symptoms.

Normally, the cervix produces mucus which acts as a barrier to prevent disease-causing microorganisms, called pathogens, from entering the uterus and moving upward to the tubes and ovaries. This barrier may be breached in two ways. A sexually transmitted pathogen, usually a single organism, invades the lining cells, alters them, and gains entry. Another way for organisms to gain entry happens when trauma or alteration to the cervix occurs. Childbirth, spontaneous or induced abortion, or use of an intrauterine contraceptive device (IUD) are all conditions that may alter or weaken the normal lining cells, making them susceptible to infection, usually by several organisms. During menstruation, the cervix widens and may allow pathogens entry into the uterine cavity.

Recent evidence suggests that bacterial vaginosis (BV), a bacterial infection of the vagina, may be associated with PID. BV results from the alteration of the balance of normal organisms in the vagina, by douching, for example. While the balance is altered, conditions are formed that favor the overgrowth of anaerobic bacteria, which thrive in the absence of free oxygen. A copious discharge is usually present. Should some trauma occur in the presence of anaerobic bacteria, such as menses, abortion, intercourse, or childbirth, these organisms may gain entrance to the upper genital organs.

The most common symptom of PID is pelvic pain. However, many women with PID have symptoms so mild that they may be unaware that an infection exists.

In acute salpingitis, a common form of PID, swelling of the fallopian tubes may cause tenderness on physical examination. Fever may be present. Abscesses may develop in the tubes, ovaries, or in the surrounding pelvic cavity. Infectious discharge may leak into the peritoneal cavity and cause peritonitis, or abscesses may rupture causing a life-threatening surgical emergency.

Chronic salpingitis may follow an acute attack. Subsequent to inflammation, scarring and resulting adhesions may result in chronic pain and irregular menses. Due to blockage of the tubes by scar tissue, women with chronic salpingitis are at high risk of having an ectopic pregnancy. The fertilized ovum is unable to travel down the fallopian tube to the uterus and implants itself in the tube, on the ovary, or in the peritoneal cavity. This condition can also be a life-threatening surgical emergency.

IUD

IUD usage has been strongly associated with the development of PID. Bacteria may be introduced to the uterine cavity while the IUD is being inserted or may travel up the tail of the IUD from the cervix into the uterus. Uterine tissue in association with the IUD shows areas of inflammation that may increase its susceptibility to pathogens.

Susceptibility to STDs

Susceptibility to STDs involves many factors, some of which are not known. The ability of the organism to produce disease and the circumstances that place the organism in the right place at a time when a trauma or alteration to the lining cells has occurred are factors. The individual's own immune response also helps to determine whether infection occurs.

Diagnosis

If PID is suspected, the physician will take a complete medical history and perform an internal pelvic examination. Other diseases that may cause pelvic pain, such as appendicitis and endometriosis, must be ruled out. If pelvic examination reveals tenderness or pain in that region, or tenderness on movement of the cervix, these are good physical signs that PID is present.

Specific diagnosis of PID is difficult to make because the upper pelvic organs are hard to reach for samplings. The physician may take samples directly from the cervix to identify the organisms that may be responsible for infection. Two blood tests may help to establish the existence of an inflammatory process. A positive C-reactive protein (CRP) and an elevated erythrocyte sedimentation rate (ESR) indicate the presence of inflammation. The physician may take fluid from the cavity surrounding the ovaries called the *cul de sac*; this fluid may be examined directly for bacteria or may be used for culture. Diagnosis of PID may also be done using a laparoscope, but laparoscopy is expensive, and it is an invasive procedure that carries some risk for the patient.

Treatment

The goals of treatment are to reduce or eliminate the clinical symptoms and abnormal physical findings, to get rid of the microorganisms, and to prevent long term consequences such as infertility and the possibility of ectopic pregnancy. If acute salpingitis is suspected, treatment with antibiotics should begin immediately. Early

intervention is crucial to keep the fallopian tubes undamaged. The patient is usually treated with at least two broad spectrum antibiotics that can kill both *N. gonorrhoeae* and *C. trachomatis* plus other types of bacteria that may have the potential to cause infection. Hospitalization may be required to ensure compliance. Treatment for chronic PID may involve hysterectomy, which may be helpful in some cases.

If a woman is diagnosed with PID, she should see that her sexual partner is also treated to prevent the possibility of reinfection.

Alternative treatment

Alternative therapy should be complementary to antibiotic therapy. For pain relief, an experienced practitioner may apply castor oil packs, or use acupressure or acupuncture. Some herbs, such as *Echinacea* (*Echinacea* spp.) and calendula (*Calendula officinalis*) are believed to have antimicrobial activity and may be taken to augment the action of prescribed antibiotics. General tonic herbs, as well as good nutrition and rest, are important in recovery and strengthening after an episode of PID. Blue cohosh (*Caulophyllum thalictroides*) and false unicorn root (*Chamaelirium luteum*) are recommended as tonics for the general well-being of the female genital tract.

Prognosis

PID can be cured if the initial infection is treated immediately. If infection is not recognized, as frequently happens, the process of tissue destruction and scarring that results from inflammation of the tubes results in irreversible changes in the tube structure that cannot be restored to normal. Subsequent bouts of PID increase a woman's risks manifold. Thirty to forty percent of cases of female infertility are due to acute salpingitis.

With modern antibiotic therapy, death from PID is almost nonexistent. In rare instances, death may occur from the rupture of tubo-ovarian abscesses and the resulting infection in the abdominal cavity. One recent study has linked infertility, a consequence of PID, with a higher risk of ovarian cancer.

Prevention

The prevention of PID is a direct result of the prevention and prompt recognition and treatment of STDs or of any suspected infection involving the female genital tract. The main symptom of infection is an abnormal discharge. To distinguish an abnormal discharge from the mild fluctuations of normal discharge associated with the menstrual cycle takes vigilance and self-awareness. Sexually active women must be able to detect symptoms of lower genital tract disease. Ideally these women will be able to have a frank dialogue regarding their sexual history, risks for PID, and treatment options with their physicians. Also, these women should have open discussions with their sexual partners regarding disclosure of significant symptoms of possible infection.

Lifestyle changes should be geared to preventing the transfer of organisms when the body's delicate lining cells are unprotected or compromised. Barrier contraceptives, such as condoms, diaphragms, and cervical caps should be used. Women in monogamous relationships should use barrier contraceptives during menses and take their physician's advice regarding intercourse following abortion, childbirth, or biopsy procedures.