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Review Article

Comprehensive Overview of Pelvic Inflammatory Disease

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ABSTRACT

Pelvic inflammatory disease (PID) is a dangerous health issue that arises from the migration of germs from the lower genital tract to the upper reproductive organs. STIs such as Neisseria gonorrhoeae and Chlamydia trachomatis are the main cause of PID. This condition can cause persistent pelvic pain, ectopic pregnancy, and infertility, among other serious side effects. Due to its polymicrobial etiology, PID has grown as a result of the proliferation of several aerobic and anaerobic bacteria. Diagnosis might be challenging because of its wide range of clinical symptoms and overlap with other conditions. Recent studies, such the Pelvic Inflammatory Disease Evaluation and Clinical Health (PEACH) trial, have increased our understanding of the causes, symptoms, and management of PID. For both inpatient and outpatient care, treatment must be initiated promptly, based on clinical suspicion, and adhere to specific protocols.

INTRODUCTION

Pelvic inflammatory disease (PID) is most commonly caused by the ascent of bacteria from the female lower genital tract (vagina and endocervix) to the endometrium and fallopian tubes, which leads to infection. It is frequently brought on by a sexually transmitted infection (STD), which has the potential to harm a pelvis that was previously healthy. This may make it more susceptible to subsequent colonization by a range of aerobic and anaerobic, opportunistic and pathogenic microorganisms, leading to the now well acknowledged polymicrobial aetiology. Acute infection rates are high, and events like delivery, miscarriage, or surgical procedures that may weaken the host genital tract's natural defences also raise this risk. Inflammation of the endometrium, fallopian tubes, pelvic peritoneum, and surrounding structures are the symptoms of the syndrome. It is believed to be caused by organisms ascending from the endocervix to the upper genital tract (UGT), mainly sexually

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transmitted diseases (STIs) chlamydia and gonorrhoea. The fact that PID manifests in a variety of clinical situations and has widely varying clinical characteristics contributed to the disease's complexity. In addition, a large portion of the seminal research on the diagnosis, management, and outcomes of PID was finished in the 1960s and 1970s.However, a number of studies have been published more recently, including findings from the randomized controlled trial Pelvic Inflammatory Disease Evaluation and Clinical Health (PEACH). While these studies have caused complexity in some areas, they have cleared up a lot of the uncertainty that was around PID.

Etiology:

An ascending cervical infection causes PID. Eighty-five percent of cases are caused by sexually transmitted illnesses. The bacteria Neisseria gonorrhoeae and Chlamydia trachomatis are the most common pathogens among the offending agents. Gonorrhoeal PID is usually more severe than PID resulting from other causes. Chlamydia-related PID is more likely to result in subclinical PID since it is less likely to cause symptoms. Although subclinical PID seldom shows symptoms, it can nonetheless have detrimental long-term repercussions. Other cervical bacteria, including Mycoplasma dentalium, have been implicated in the disease. Additionally, respiratory pathogens (Streptococcus pneumonia, Staphylococcus aureus, and Haemophiles influenza), enteric pathogens (Escherichia coli, Bacteroides fragilis, and group B streptococci), and pathogens that cause bacterial vaginosis (Pepto streptococcus species, Bacteroides species) have been connected to acute PID. They comprise around 15% of all cases.[1].[2] [3]

Risk Factors:

Numerous established risk factors have been linked to pelvic inflammatory disease. These might be a helpful addition to the diagnostic process to support or contradict clinical signs. In an effort to enhance the detection of asymptomatic or clinically mild disease, they may also make it easier to target groups that are considered to be "at risk."

• Age, ethnicity and sexual activity:

The identification of a sexually transmitted agent in as many as 60% of confirmed cases of PID6 allows for the separation of risk markers for upper vaginal tract infections and STDs. Early coitarche7, black race7, and young age have all been linked to an increased risk of sexually transmitted infections (STDs), as have frequent sex and partner switching. It is believed that both behavioural and physiological factors contribute to the association with early age. Teens have higher rates of infection in their partner pool, are less likely to use barrier contraception, and are more likely to swap partners sexually. They do, however, also exhibit increased cervical ectopy rates and cervical mucus penetrability, which may further raise infection susceptibility [4]. As a result, risk variables are linked to sexual behaviour and emphasize the significance of routinely obtaining an asexual history during consultations [5].

• Oral contraceptives:

There is a link between the oral contraceptive pill and a higher risk of cervical chlamydial infection. The reason for this could be either the actual occurrence of a higher incidence or the ease with which C. trachomatis can be isolated and cultured from the exposed columnar epithelium. Nonetheless, studies have also demonstrated that pill users have a decreased prevalence of PID, a milder disease at the laparoscopic level, and a one-third reduction in tubal infertility when compared to non-using oral contraceptive controls at the infection time [6].

• Intrauterine contraceptive device:

The IUCD has had limited use as a method of contraception due to its frequent negative associations with PID risk. Recent research has confirmed that the elevated risk of PID is limited to the first 20 days after insertion and that any subsequent risk is only associated with the baseline risk of STD [7]. This implies that devices should be maintained in place for their entire lifespan if there are no compelling reasons to remove them earlier. It also has practical implications for screening for infection before inserting IUCDs. However, in the event of acute PID, IUCD removal is most likely advised.

• Bacterial vaginosis:

According to some research, PID is associated with a higher incidence of bacterial vaginosis. In 61.8% of women with PID verified by laparoscopy, Soper et al. (2014) found vaginal microbes associated with bacterial vaginosis. This conclusion was contradicted by Faro et al. (2015), who showed that the vaginal bacterial or found was not characteristic of bacterial vaginosis as defined by microbiological standards.[8]

• Other risk factors:

Numerous other variables have been suggested but are not as strongly supported. It is uncertain if the associations between vaginal douching, alcohol consumption, drug usage, and smoking are direct or indirect.

Pathophysiology:

The pathophysiology of an upper female genital tract infection includes inflammation induced damage that can result in adhesions, scarring, and partial or total blockage of the Fallopian tubes. Ovum mobility would be impeded, and the risk of ectopic pregnancy and infertility would increase, if the ciliated epithelial cells lining the fallopian tube were to disappear. Moreover, adhesions may cause chronic pelvic pain. [9]

Diagnosis Of Pid:

- Blood studies:

For detecting acute pelvic inflammatory disease (PID), conventional blood tests like leucocytosis are insufficiently sensitive or specific. Thirty-three to fifty percent of PID cases may not have leucocytosis, an increased white blood cell count. Because leucocytosis is an unreliable stand-alone marker for PID and can also be shown in a number of other inflammatory disorders, this is especially troublesome. These blood markers' low sensitivity and specificity highlight how crucial it is to combine clinical observations with more conclusive diagnostic methods, like ultrasound imaging or direct visualisation via laparoscopy, in order to properly identify PID. [19,14] Erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP) are nonspecific indicators of inflammation that are frequently assessed in the evaluation of suspected PID. These markers are not definitive, even though they are frequently raised in PID cases. According to research, the ESR may stay normal (less than 15 mm/h) in 25–36% of PID cases, and the CRP may not be raised (less than 20 mg/L) in roughly 26% of cases. Their usefulness in detecting PID is further limited by this variability, underscoring the necessity of further diagnostic techniques such pelvic ultrasonography or laparoscopy, particularly when blood tests fail to clearly show infection or inflammation.

• Cervical gram stain:

A useful but sometimes disregarded diagnostic technique for assessing a patient for acute pelvic inflammatory disease (PID) is the cervical Gramme stain. By looking for possible pathogens and white blood cells (WBCs) in the cervical discharge, it offers concrete proof of infection. Mucopurulent cervicitis, a crucial indicator of PID, can be strongly suggested if 10 or more white blood cells are seen per oil immersion field. Despite not being unique to PID, this study suggests a significant inflammatory response, which is frequently connected to bacterial infections that, if left untreated, can develop into

PID. In order to confirm the diagnosis and direct treatment, the cervical Gramme stain might be a useful adjunct when paired with clinical symptoms and other diagnostic findings. [14, 16, 17] On a cervical Gramme stain, the presence of gram-negative intracellular diplococci in neutrophils strongly suggests an infection with Neisseria gonorrhoeae, a common cause of PID. These organisms have a rather high sensitivity and specificity when detected in the setting of acute pelvic pain: roughly 68% sensitivity and 98% specificity for gonococcal cervicitis. It can therefore be used as a useful diagnostic hint, especially in conjunction with PID clinical symptoms. The patient is highly likely to have gonococcal cervicitis (and maybe PID) when this result is present, according to the high specificity. Because gonococcal infections necessitate focused antibiotic therapy, the Gramme stain can therefore not only help the diagnosis of PID but also direct proper treatment.

• Pelvic ultrasonography:

Pelvic sonography is mostly used as an adjuvant in the diagnosis of acute PID. Sonogram results that are consistent with PID include fluid in the cul-de-sac, enlargement of the ovaries, tubes, and ligaments, dilatation and distention of the fallopian tubes, and the appearance of a complex, multiloculated mass with solid and cystic sections, including the uterus. Since the sonographic anomalies associated with PID are not unique and can be detected in other intrapelvic conditions, cautious clinical correlation is still required even if endovaginally sonography offers superior picture resolution. [21, 24] A pelvic ultrasound scan can be used to monitor a patient's response to medication and has a high degree of accuracy (93 percent sensitivity and 99 percent specificity) in detecting pelvic abscesses. It is also helpful in evaluating patients whose pain, obesity, or uncooperativeness prevent a comprehensive pelvic examination.[25]

• Diagnostic laparoscopy:

Diagnostic laparoscopy is a minimally invasive surgical procedure used to examine the pelvic organs, including the fallopian tubes, ovaries, uterus, and surrounding structures. It is particularly valuable in diagnosing pelvic inflammatory disease (PID) when the clinical presentation is unclear or when other diagnostic methods (such as ultrasound or physical exams) don't provide definitive information. During laparoscopy, the doctor can directly observe signs of PID, which include:

- Fallopian tube erythema (redness): This indicates inflammation.
- Fallopian tube edema (swelling): This can occur as a result of infection.
-Spontaneous or expressible tubal exudate: This refers to the release of pus or other fluid from the fallopian tubes when pressure is applied, which is a strong indicator of active infection.

These criteria, along with other clinical findings, can help confirm a diagnosis of PID and guide appropriate treatment. Diagnostic laparoscopy is often considered the gold standard for diagnosing PID, especially in more complex or severe cases. [10,12] While many in vestigators consider laparoscopy to be the gold standard for diagnosing PID, Sellors et al. have lately raised concerns about the diagnostic accuracy of this procedure.[25] In their study, they compared PID diagnosed histopathologically from a fimbrial minibiopsy specimen obtained during laparoscopy with PID diagnosed visually. They found that less than 40% of patients with histopathologically diagnosed PID had spontaneous or expressible exudate, and only 50% of patients had tubal erythema and oedema on laparoscopic examination. While some authorities have recommended that all patients with suspected acute PID undergo laparoscopy on a regular basis, the cost benefit analysis and risk-benefit analysis of this strategy are yet unknown. While

laparoscopy is usually thought to be a safe technique when carried out by a skilled practitioner, there are some risks involved. It is predicted that for every 100,000 laparoscopies conducted, there are five deaths and five serious morbid events (blood vessel injury, hollow viscus penetration, bleeding, gas embolism, etc.) for every 1000 procedures.[26] However, diagnostic laparoscopy ought to be seriously taken into consideration for patients whose suspected PID is not responding to medication, as well as for those whose diagnosis is still unclear even after a thorough evaluation and for whom it is necessary to rule out surgical emergencies.

• Establishing the diagnosis:

It can be very difficult to differentiate acute pelvic inflammatory disease (PID) from other causes of acute pelvic discomfort in a clinical setting. As you said, a study conducted by Jacobson and Westrom revealed that only 65% of the 814 women who had a clinical suspicion of acute PID underwent a laparoscopy to confirm the diagnosis. The diagnostic issue that doctors encounter when assessing patients who may have PID is highlighted by this.In [12] The difficulties in identifying acute pelvic inflammatory disease (PID), as evidenced by studies such as those conducted by Westrom and Jacobson, Allen and Schoon, and Morcos et al. In 23 percent of their cases, diagnostic laparoscopy showed a normal pelvic examination, indicating the absence of PID or other pathologic diseases, even when PID was clinically suspected. The fact that many other disorders can cause similar symptoms and that not all PID cases are simple or exhibit typical indicators highlights how challenging it is to make a clinical diagnosis of PID. Furthermore, it was discovered that 12% of the patients in Jacobson and Westrom's study had other pathologic conditions. [11] who revealed that only 76 and 61 percent of patients, respectively, were able to validate their PID prelaparoscopic diagnoses. Since the clinical diagnosis of PID is unstable, several academics have proposed that a diagnosis cannot be made with confidence or reliability until specific criteria established by laparoscopic research are met. [27] These needs frequently include adnexal soreness, cervical movement, and lower abdominal pain, together with at least one of the following: 1. 2. 3. 4. 5. 6. Warmth above 3 degrees Celsius Ten thousand five hundred leucocytosis per cubic millimetre Purulent particles aspirated during culdocentesis, a pelvic ultrasound image of an inflammatory tumour an erythrocyte sedimentation rate exceeding 15 mm/h Evidence of either a nonculture or cultured gonococcal or chlamydial infection of the endocervix 7. More than five to ten white cells per oil immersion area, as determined by the Gramme stain of the endocervical discharge, indicates mucopurulent cervicitis. Diagnostic guidelines published by the CDC in 1991 support reducing the clinical threshold for assuming that a patient has PID. The organisation took this action after realising that imposing stringent diagnostic standards would result in an intolerable number of mild PID cases staying undetected and untreated. [22] As long as other potential conditions (such as appendicitis, endometriosis, or ovarian cysts) have been ruled out, doctors should begin antibiotic treatment as soon as a patient exhibits symptoms of PID, such as lower abdominal pain, ovulation tenderness, and pain when the cervix is moved, according to CDC guidelines. This is crucial since early PID treatment might avert major issues including infertility or prolonged pain.[22]

• Microbiological diagnosis:

Sexually transmitted infections (STIs), including gonorrhoea and chlamydia, are frequently the primary causes of pelvic inflammatory disease (PID). Physicians frequently take samples from the lower genital tract (LGT) in order to identify these infections, which can aid in the diagnosis of the infections that cause PID. The likelihood of

finding the infection is increased when samples are taken from several locations, such as the cervix, vagina, and urine. To diagnose PID, however, sampling from the upper genital tract (UGT), which includes parts like the uterus and fallopian tubes, is more intrusive and not always required or suitable. Because some infections may be in the upper reproductive organs and UGT sampling may be required in some situations, a negative lower genital tract (LGT) test result does not always mean that PID is not present.

Management of PID:

A patient's symptoms and physical examination are the primary factors used to diagnose PID. During a physical examination, every sexually active young woman who exhibits indications of genital tract soreness and lower abdominal or pelvic pain should be assessed for PID. The results of laboratory tests, such as the NAAT test for STIs, usually take hours or even days to come back, but they can help support the diagnosis. A negative NAAT result does not necessarily mean that PID is not present. If a clinician suspects PID based on the patient's symptoms and exam results, treatment with antibiotics should begin straight away, even before full test results are available, as PID is essentially a clinical diagnosis. Infertility and persistent pelvic pain are among the consequences that can be avoided with early and effective treatment. [28, 29, 30] Patients with Pelvic Inflammatory Disease (PID) may require hospital admission in certain situations, such as:

- Pregnancy
– Ineffective outpatient therapy
- Severe clinical disease
- PID with a pelvic abscess
- Potential need for surgery (e.g., drainage of an abscess or treatment of a ruptured tuboovarian abscess)
- For severe cases or when surgery might be needed, patients are admitted to the hospital for intravenous antibiotics.
- Outpatient treatment typically includes a single dose of ceftriaxone or cefoxitin along with Doxycycline for 14 days. If trichomoniasis or vaginal procedures are a concern, Metronidazole is added.
- Close follow-up is necessary for outpatient therapy to ensure treatment success and avoid complications.

CONCLUSION:

Pelvic inflammatory disease (PID) remains a critical public health issue due to its potential to cause significant long-term complications, including infertility and chronic pelvic pain. The complexity of its diagnosis, stemming from varied clinical presentations and overlapping symptoms with other conditions, necessitates a careful and timely approach to management. The recognition of PID's polymicrobial nature highlights the importance of considering a broad range of pathogens in both diagnosis and treatment. Recent studies, such as the PEACH trial, have provided valuable insights, yet uncertainties regarding optimal diagnostic criteria and management strategies persist. Early empirical treatment is essential, particularly for at-risk populations, while continued follow-up is necessary to ensure resolution and monitor for complications. Future research efforts should focus on enhancing diagnostic accuracy, understanding the disease's pathophysiology, and improving treatment outcomes to better address this pervasive condition

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