Pelvic Infections & Sexually Transmitted Diseases in Adolescents

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Summary: **The term PID is used to describe the clinical features of sexually transmitted pelvic infections in which there is infection of the female reproductive tract above the internal os of the cervix. Adolescents in particular require aggressive care of PID to prevent the long-term sequelae of chronic pelvic pain and infertility. This article reviews the etiology, microbiology, diagnosis management and Sequele of PID & STD, with an emphasis on treating adolescents. Barrier contraceptives successfully reduce the incidence of PID. Development of PID is often associated with menstruation. Lack of understanding of the effects of the problems causes easy spread of this infection amongst adolescent. PID can be grouped into different grades on the basis of onset and recurrence as acute and chronic PID. Acute PID can be graded depending on the clinical features. The most vulnerable age group for developing PID is 15-24 years. Vaginal acidity and cervical mucus normally regarded as protective, do not effectively prevent PID. The clinical spectrum of PID is wide. Women with lower abdominal pain should be assessed carefully and if PID is the cause they should be treated for gonococcal, chlamydial and anaerobic bacterial infection. On examination, temperature may be rarely elevated in acute PID. MR imaging is more accurate than Transvaginal USG in the diagnosis of PID and provides information about the differential diagnosis of PID. Clinical diagnosis of PID has limitations. Chief complaint of abnormal vaginal discharge predicted a significantly lower rate of gonorrhea or chlamydial infection than rates observed with no complaint of vaginal discharge. Clinical situation strongly guides the principles of management of PID in adolescents. The results of this survey suggest that emergency department pediatricians frequently diagnose PID in adolescent girls and understand the high risk of medical complications in this age group. The increased incidence of sexually transmitted disease (STD) in the adolescent population has led the Center for Disease Control and Prevention to highly recommend inpatient therapy for all adolescents with pelvic inflammatory disease (PID). Chronic pelvic pain is an incapacitating stigma of PID. Much can be written on prevention of PID. Prevention of sexually transmitted diseases and ascending infection are of utmost importance in decreasing tubal factor infertility and ectopic pregnancy. Widespread screening for cervical infection followed by timely and appropriate treatment is the key for prevention of PID. Patient administered medication to the partner effectively prevents recurrence of PID as has been shown recently.**

Introduction

Pelvic infection is a non-specific word describing infection of the uterus, fallopian tubes, adjoining parametrium and overlying peritoneum. It does not include vulvar or vaginal infections. The term PID is used to describe the clinical features of sexually transmitted pelvic infections in which there is infection of the reproductive tract of women above the internal os of the cervix. This usually occurs as a result of an ascending cervical infection caused by Neisseria gonorrhea, Chlamydia trachomatis and anaerobic bacteria. The age group of adolescents has the highest risk for nearly all STDs (Latif, 1998). Adolescents in particular require aggressive care of PID to prevent the long-term sequelae of chronic pelvic pain and infertility. (Rome et al 1998). This article reviews the etiology, microbiology, diagnosis, management and sequelae of PID & STD, with an emphasis on treating adolescents.

Epidemiology

Adolescents are typically grouped as early (11-14 yrs.), middle (15-17 yrs.) and late (18-21 yrs). It is calculated that the incidence of PID is higher amongst 15-21 years old women who have relations with untreated male partners. A recent study by Miller et al (1999) showed that overall, 6% of sexually active women reported a history of a bacterial STD and 8% reported a history of PID. Women who first had sexual intercourse before a

15 were nearly 4 times as likely to report a bacterial STD, and more than twice as likely to report PID, as were women who first had sex after age 18. Having more than 5 lifetime sexual partners also was associated with greater chance of having STD (23%) than that among women who reported no such history (7%). In multivariate analyses, age, race, age at first intercourse and lifetime number of sexual partners had a significant effect on the risk of a bacterial STD. Education, age, a history of IUD use, douching and a history of a bacterial STD had a significant impact on the risk of PID.

Poor personal hygiene, excess blood loss during periods or postpartum and tissue destruction during procedures like MTP / septic induced abortions greatly increase the chances of PID. Barrier contraceptives successfully reduce the incidence of PID. But the knowledge regarding such contraceptive practices is poor in adolescents. Also, their accessibility to contraceptives is also limited.

Cigarette smoking and other health risk behaviors are more prevalent among adolescents in an STD clinic than among adolescents in a community health center, STD clinics are potential sites for cigarette, alcohol, and drug use interventions among "hard to reach"adolescents. (McKenzie et al, 1998).

Pathogenesis

The etiology of the condition is polymicrobial. It has been found that even when the disease is not sexually transmitted, albeit rarely, the spread is usually from the lower genital tract. In sexually active adolescents, both spermatozoa as well as the trichomonads are postulated as carriers of these organisms from the lower genital tract. However, the exact importance of this in PID is unknown.

Lymphatic spread has been demonstrated in animals using Mycoplasma hominis. Development of PID is often associated with menstruation. This could either be cervical in origin or retrograde.

Initial symptoms are those of endometritis resulting in irregular bleeding. Infection then spreads to the endosalpinx causing a mucosal inflammation followed by edema of tubal wall and production of an exudate that leaks through the fimbrial end of the fallopian tube. Inflammation of other pelvic organs produces adhesions amongst the inflamed tissues. The fimbrial end of the tube ultimately gets sealed off due to adhesions. There can be a permanent damage to the tubes and tubo-ovarian mass can result. This infection can even spread to the paracolic space ultimately affecting the liver. Here it produces adhesions between the liver and the abdominal wall. This is also described as Fitz-Hugh-Curtis syndrome.

Lack of understanding of the effects of the problems causes easy spread of this infection amongst adolescent. Also, low levels of protective antibodies add to the rapid spread of infection and causation of sequelae.

Grades of PID

PID can be grouped into different grades on the basis of onset and recurrence as acute and chronic PID. Acute PID can be graded depending on the clinical features:

Grade-1: Uncomplicated salpingitis or salpingo-oopheritis (unilateral or bilateral)
(A) Without pelvic peritonitis. (B) With pelvic peritonitis.
Grade-II: Complicated salpingitis or salpingo-oophoritis, pyosalpinx or tuboovarian masses (unilateral or bilateral).
(A) Without pelvic peritonitis (B) with pelvic peritonitis.
Grade-III: Large (more than 8cm. diameter) T.O. masses or pelvic abscesses, spread of infection to upper abdomen (generalized peritonitis) and ruptured tubo-ovarian abscess.

Microbiology

Different organisms have been implicated in causing PID. By using tubal cultures and serological tests, Miller et al (1999) found Chlamydia in 40 to 60%, N. Gonorrhea in 15 to 18%, M. Hominis in 3 to 5% and unknown organisms in the remaining. It is possible that after a primary insult by a specific organism like N. gonorrhea,

there can be a secondary invasion by non-specific organisms. It is also true that though PID has increased, N. Gonorrhea has decreased over the period of years.

Gonococcal diseases usually present with a short history and a pyrexial illness. There can be a severe clinical picture. But the response to therapy is equally dramatic. However, one third of adolescents with gonococcal PID can be asymptomatic. A longer history and a more benign clinical presentation characterize chlamydial infection. It may even be asymptomatic. Anaerobic infections being associated with abscesses, the disease can be severe and often with palpable adenexal masses and signs of pelvic peritonitis.

Predisposing Factors

1. Sexual activity: Amongst adolescents, this is a major predisposing factor for PID. As has been previously described, the micro-organisms use sperms or trichomonads (both motile structures) to reach the upper genital tract.
2. Age: 15 to 24 years is the most vulnerable age group for developing PID. Vaginal acidity and cervical mucus normally regarded as protective, do not effectively prevent PID.
3. Miscellaneous: Inability to appreciate the risk of PID, lack of easy access to barrier contraceptives, early marriages and childbirth, lack of operational thinking amongst adolescents, etc. are all recognized predisposing factors for adolescent PID.

Clinical Features

The clinical spectrum of PID is wide. It ranges from subclinical endometritis to severe salpingitis, pyosalpinx, tubo-ovarian abscess, pelvic peritonitis, and perihepatitis (Paavone 1998). Most important and consistent of these is lower abdominal pain. It is confined initially to lower abdomen and is bilateral. It is present at times in the form of dysmenorrhea. The symptom of lower abdominal pain in women is extremely common and does not always indicate the presence of serious illness. However, women with certain serious conditions such as pelvic inflammatory disease, acute appendicitis, ectopic pregnancy and other complications of pregnancy may present initially with this symptom. Therefore, in managing women with lower abdominal pain care should be taken to exclude any serious condition before dismissing the patient. Women with lower abdominal pain should be assessed carefully and if PID is the cause they should be treated for gonococcal, chlamydial and anaerobic bacterial infection. (Latif, 1998)

Menstrual irregularities in the form of irregular bleeding or heavy bleeding are found in PID. Many patients also complain of leucorrhea. Severe infection can have nausea, vomiting, malaise or fever.

On examination, temperature may be rarely elevated in acute PID. There can be accompanying tachycardia. Lower abdominal tenderness may be present with guarding and features of peritonitis may be present. Cervical movements can be tender. There can be bilateral tenderness in the fornix and T.O. mass may be palpable.

Investigations

Though routine investigations are always listed ritually, it is imperative to concentrate upon the relevant investigations in this section. They should help in confirming the diagnosis or rationalizing the management. In the light of the same, a total and differential WBC count will indicate infection. A urinary pregnancy test will rule out an ectopic pregnancy. A high vaginal swab will indicate the organisms involved and indicate the sensitivity of antibiotics. Urine based light chain reaction screening is the most cost-effective strategy to detect chlamydial and gonococcal genital infection in asymptomatic sexually active adolescent females and owing to ease of implementation, the most likely to prevent the greatest number of cases of PID. (Shafer et al, 1999). Ultrasonography in adolescent will be useful if trans-vaginal sonography can be done. This will be possible in those who have a regular intercourse. An abdominal scan will reveal the T.O. masses. Though Laparoscopy is considered as a gold standard, its popularity in young adolescents is limited due to invasiveness of its character. MRI and color Doppl

have also been used of late in the list of investigations for PID. MR imaging is more accurate than transvaginal USG in the diagnosis of PID and provides information about the differential diagnosis of PID. MR imaging may reduce the need for diagnostic laparoscopy. (Tukeva et al 1999).

Diagnosis

Clinical diagnosis of PID has limitations. The clinical diagnostic criteria are insensitive and nonspecific, and false-positive and false-negative diagnosis is common. However, direct visual diagnosis is not always feasible, requires general anesthesia, and is costly (Paavone, 1998). An interesting study by Ryan (1998) shows good clinical points for diagnosis. Chief complaint of abnormal vaginal discharge predicted a significantly lower rate of gonorrhea (GC) or chlamydial infection (CT) than rates observed with no complaint of vaginal discharge. Only the elicited symptom of yellow vaginal discharge (not the more common symptom of increased or malodorous vaginal discharge) predicted GC or CT. Chief complaint of abnormal vaginal discharge itself predicted trichomoniasis and bacterial veginosis, not cervical infection. Candida albicans was strongly associated with the chief complaint of vulvar pruritus, not with the chief complaint of abnormal vaginal discharge. Applying these algorithms in STD clinics only to women with the chief complaint of abnormal vaginal discharge, rather than to all women, decreases sensitivity for GC or CT, without increasing positive predictive value (PPV). Criteria for inclusion of patients have more effect on the performance of these algorithms than do the levels of evaluation used. A modified World Health Organization algorithm applied only to patients with symptoms of vaginal discharge, involving treatment for cervical infection, followed by treatment of vaginal infections and cervicitis based on examination had a sensitivity of 50% and PPV of 33% for cervictis infection, and very low sensitivity for BV, TV, and for vulvovaginal candidiasis (Shew et al, 1999).

Treatment

In preparing the 1998 sexually transmitted disease treatment guidelines of the Center for Disease Control and Prevention, evidence regarding the need to eradicte anaerobes when treating pelvic inflammatory disease was reviewed. Anaerobes are present in the upper genital tract during an episode of acute PID, with the prevalence dependent on the population under study. Vaginal anaerobes can facilitate acquisition of PID and cause tissue damage to the fallopian tube, either directly or indirectly through the host inflammatory response. Use of several broad-spectrum regimens appears to result in excellent clinical cure rates, despite the fact that some combination falls short of providing comprehensive coverage of anaerobes. There are limited data on the long term effects of failing to eradicate anaerobes from the upper genital tract. Concern that tissue damage may continue when anaerobes are suboptimally treated has prompted many experts to caution that the therapeutic regimens should include comprehensive anaerobic coverage for optimal treatment of women with PID. (Walker et al, 1999). Clinical situation strongly guides the principles of management of PID in adolescents. In many cases, treatment has to be started before the identification of the organisms as culture & sensitivity reports take time. An interesting survey in this has been recently published. Fifty-one (94%) of 54 emergency department pediatricians had diagnosed PID in adolescents at least once within the past 2 years, and 35 (69%) had diagnosed PID, on average, once per month or more. Less than half the pediatricians, 23/52 (45%) routinely recommended hospital admission for adolescents with PID as suggested by the Center for Disease Control and Prevention guideline and sexually transmitted disease experts (Benaim et al, 1998). The increased incidence of sexually transmitted disease (STD) in the adolescent population has led the Center for Disease Control and Prevention to highly recommend inpatient therapy for all adolescents with pelvic inflammatory disease (PID). This in turn has led to an increased need for nurses in inpatient settings to be skilled at providing sex education to adolescents with PID. The nurse needs a clear understanding of STD and PID, and the ability to communicate effectively with adolescents to help them make healthy decisions about their sexual behavior (Bob and Famolare 1998).

- Penicillins & Cephalosporins:
  These are still the agents of choice against gonococci,

streptococci and clostridia. Ampicillin: 250 mgms. - 500 mgms. 6 hourly for 7 to 10 days. Combination of clavulanic acid makes them safe against the onslaught of penicillinase. Augmentin is such a drug with amoxycilin 250 mgms and clavulanic 125 mgms., 8 to 12 hourly for 5 to 7 days. Cephalexin: 250-500 mgms. 6 hourly for 7 to 10 days. Cephazolin Sodium: 500 mgms., 8 to 12 hourly for 7 days. Newer fourth generation cephalosporins are also being tried in resistant cases of PID.

- Aminoglycocides:
  They are valuable in serious chlamydial and gonococcal infections. Gentamycin: 80 mgms. IM 12 hourly for 7 days is recommendd.

- Macrolides:
  They are useful in chlamydial infections. Erythromycin: 250 to 500 mg x 6 to 8 hourly for 7 days. Newer macrolides like azithromycin are being currently increasingly used in PID. 1 to 2 gms., single dose is being recommended.

- Tetracyclines:
  They are useful against gram -ve aerobic bacilli, chlamydia and some anaerobes.

- Metronidazole:
  It is the agent of choice against anaerobes. Due to growing resistance, its use is now getting restricted. Metronidazole: I.V. 100-200 mgms. 8 hourly for 5-7 days.

C-reactive protein is now being increasingly used for judging the treatment response. In fact in assessing PID treatment, the determination of CRP has precedence over WBC counts and ESR as the percentage of patients with increased CRP is higher and because the changes in value follow the change in clinical condition more reliably. (Reljic et al, 1998)

Surgery and supportive therapy is necessary with medical management. Presence of T.O. mass or septic peritonitis will require surgical intervention to remove the mass and drain the pus. Recently, the role of surgeons in treating PID has been reviewed. The management of 63 patients diagnosed by surgeons as having sexually transmitted disease was audited. A diagnosis of STD was made in 51(81%) of the patients without taking a sexual history. Only 2(3%) patients were referred to genitourinary medicine (GUM). Appropriate microbiological specimens were obtained from only 2 of 52 (4%) patients diagnosed with pelvic inflammatory disease (PID). Reliance was placed on inappropriate specimens in 22 (42%). There was widespread use of inappropriate antibiotics. The management of sexually transmitted disease by surgeons was very poor. These patients should all be referred to genito-urinary medicine (Hunt et al 1998) &/or gynecologists.

In case of septicemia, supportive therapy in the form of maintenance of fluid and electrolyte balance, treatment of complications like DIC and renal failure if present, become vital. Adequate oxygenation is always helpful in such morbid cases.

Sequelae

Recurrence rates are 25%. The immediate and long-term effects of PID include salpingitis, pelvic abscess, peritonitis, infertility and predisposition to tubal ectopic pregnancy (Latif, 1998). Chronic pelvic pain is an incapacitating stigma of PID.

Prevention

Much can be written on prevention of PID. Prevention of sexually transmitted diseases and ascending infection remains of utmost importance in decreasing the sequelae, such as tubal factor infertility and ectopic pregnancy associated with PID (Soper, 1994). However, proper sexual education, easy access to barrier contraceptives, prevention of early marriages and child birth and safe motherhood principles all go a long way in preventing PID and its complications. In fact, a recent article stresses the importance of self-use reporting of condom use by adolescents in judging the risk of PID and STD. This can help in effectively preventing these conditions. In this group of adolescents, adolescents, self-report of condom use with the last two partners was associated with the

absence of an acute STD. This finding suggests that self-reported condom use is a valid indicator of risk for STDs, with implication for those working with adolescents clinically and in research contexts. (Shew et al 1997). Widespread screening for cervical infection followed by timely, and appropriate treatment is the key for prevention of PID. Health care seeking, provider training, and availability of detection technologies and drugs need to be improved (Arol and Wasserheit, 1998). Patient administered medication to the partner effectively prevents recurrence of PID as has been shown recently. The findings of this article suggest that patient delivered partner medication can protect women from recurrent C. trachomatis infection compared with the standard partner referral approach (Kissinger et al 1998). Nigerian workers have recently shown that comprehensive public health measures are needed to address these problems in Nigeria. These include the provision of reproductive health education for adolescents, the retraining of health providers and the consolidation of services for the prevention and treatment of STDs. (Okonofua et al 1999). Similar models can be effective in our setup as well.

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