

PATHOGENESIS OF ACUTE PELVIC INFLAMMATORY DISEASE

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Pelvic inflammatory disease (PID) is a general term which refers to an inflammatory condition of the female upper genital tract. Clinically the term PID is most often used to denote acute or chronic infectious condition of the fallopian tubes and the sequelae of such infection such as tuboovarian adhesions, hydrosalpinx or tuboovarian abscesses¹. Acute PID usually results from salpingitis, which is the most common and serious genital infection. Occurring in an estimated 500,000 Americans², the infection causes serious morbidity, sterility³, chronic pelvic pain⁴ and is associated with subsequent episodes of PID. Salpingitis may follow intrauterine procedures such as curettage or the insertion of a contraceptive device. The disease is usually due to an ascending infection which is often sexually transmitted. A variety of organisms cause pelvic sepsis with superadded secondary infection and that is why the primary pathogen remains unidentified. Gonococci, coliforms, anaerobes (principally bacteroides, Gram's positive pyogenes, gas forming organisms or mycoplasma), and enterobacter may be responsible and recently chlamydia have also been found to produce a significant proportion of PID and infection of lower genital urinary tract. A recent study by Wasserheit in 22 women with proven salpingitis found *C. trachomatis* infection more prevalent than *N. gonorrhoeae*⁵. Chlamydial antigen was studied in 221 women in Karachi by ELISA method and 14 (63%) cases were found to be positive for the antigen. The frequency of a chlamydial antigen positivity varied in various groups, being maximally positive in infertile group (9.4%), followed by IUD users (7.7%) and PID patients (25%). None of the pregnant females were positive for the antigen⁶. Occasionally ascending pelvic infection is tuberculous or actinomycotic in origin. The role of mycoplasma or of other bacteria in PID is less certain. *M. hominis* and *U. urealyticum* are common components of the normal vaginal flora, together with other aerobic and anaerobic bacteria, but they may cause opportunistic infection following alterations in lower genital tract ecology^{7,8} as a result of infection with a primary pathogen (chlamydia or gonococci), presence of intra uterine contraceptive devices, surgical intervention and manipulation or trauma to genital tract during delivery or abortion. The route of infection for mycoplasma salpingitis differs from gonococcal or Chlamydial infection. Mycoplasma spreads from the cervix to uterus via blood vessels or lymphatics to cause parametritis and exosalpingitis whereas Chlamydiae and gonococci ascend canalicularly via the uterus to cause upper genital tract infection. Acute pelvic inflammatory disease can be divided, on the basis of microbial etiology, into those cases caused by *N. gonorrhoeae* alone, those caused by *N. gonorrhoeae* along with other bacteria and those caused by other bacteria⁹. In Seattle, approximately one half of all women with PID have evidence of endocervical gonococcal infection. Peritoneal exudates from these cases usually reveal *N. gonorrhoeae* alone, but occasionally they appear along with other cervico-vaginal bacteria or only other bacteria are recovered. Among patients without endocervical gonococcal infection peritoneal cultures and gram stain show bacteria other than *N. gonorrhoeae*, most commonly bacteroides, fragilis and anaerobic gram's positive cocci⁹. Although *N. gonorrhoeae* has long been considered the major cause of PID, but recent studies have found a rising proportion of non-gonococcal PID; by improved culture technique, workers have isolated chlamydia trachomatis, anaerobic bacteria, enterobacteria and mycoplasma hominis as bacterial pathogens of acute salpingitis⁷, but the relative importance of these as primary or secondary pathogens is not clear: Anaerobic organisms are important as secondary invaders than as a primary cause of PID, but the possibility that they may initiate infection is not excluded. Anaerobic bacteria are

often recovered from pelvic abscesses post partum endometritis and septic abortions¹⁰, but Westron and Mardh were unable to isolate anaerobes from any tubal specimen from twenty women with acute salpingitis¹¹. The best explanation of these conflicting data seems to be that patients, who have PH) without any previous intrauterine procedure, first develop infection of the lower genital tract by sexually transmitted organisms, of which *N. gonorrhoeae* and *Chlamydia trachomatis* are the most important. These organisms ascend in the epithelium, subepithelium, connective tissues or lymphatics and initiate salpingitis; they also cause secondary invasion by the normal vaginal flora, including aerobic and anaerobic bacteria. This implies that correlation between tubal cervical cultures can only be expected early before super infection has occurred because later mixed infection are more likely to occur. After abortion, especially in second trimester infection is likely to occur and may spread rapidly to the adnexae. In these circumstances the most common infecting organisms are *E. coli*; others include, gram negative bacilli including *Bacteroides fragilis*, the clostridia, streptococci and staphylococci. Bacteremia and toxemia occur resulting in septic shock, and even death if the treatment is not prompt and effective. Pelvic infection associated with intrauterine contraceptive device (IUCD), is an ascending infection. The thread tail of the device probably act as a 'wick'. In vitro tests have isolated pathogens like beta haemolytic streptococci and *Bacteroides fragilis* in such cases. A three to four fold increase in PID is encountered in IUCD users⁷. Recently, association between an acute and potentially lethal shock syndrome caused by staphylococcal exotoxin and the use of vaginal tampons during menstruation¹² has been observed. *Staph. aureus* is the causative agent which multiplies in the retained menstrual blood producing exotoxin which is absorbed through the vaginal epithelium into the circulation and may also ascend into the uterus to be carried by retrograde menstrual flow into the peritoneal cavity. Infection of the female genital tract by the grain's positive (nonacid fast) mycelium bearing anaerobic fungus *Actinomyces israelii* was considered rare until recently. This organism is a normal commensal of the mouth and gut, but now it is more often associated with presence of an IUCD. In these cases the route of infection is from the anus across the perineum and upward through the vagina and cervix and there is often coexistent infection by other anaerobes, the combination of a foreign body causing chronic trauma and the adjacent heavy anaerobic flora of vagina provides ideal conditions for opportunistic colonization and occasionally frank infection by *actinomyces*¹³. *Actinomyces* may be difficult to culture but microscopic tissue diagnosis can be made by recognizing typical sulphur body colonies surrounded by pus containing lipid histiocytes and by special staining⁷. - The control and prevention of PID and its sequelae are through the control of sexually transmitted diseases (STD), for which three main elements, namely, (1) education of the public in behavioural and physical method of reducing the transmission of STD, (2) improved laboratory and clinical methods for the diagnosis of PID and (3) development of new vaccines against gonococcal and chlamydial infections need to be stressed.

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