Sexually transmitted pathogens in acute pelvic inflammatory disease

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Summary

The prevalence of sexually transmitted pathogens in two groups of women was studied: 50 women with clinical diagnoses of acute pelvic inflammatory disease (PID) and 50 asymptomatic women attending a family planning clinic (FPC). Genital specimens, collected by non-invasive procedures, were examined. Endocervical Neisseria gonorrhoeae was present in 52% of the PID group and 10% of the FPC group (P < 0.0001). One-third of N. gonorrhoeae isolates were penicillinase-producing strains. Chlamydia trachomatis was isolated from the endocervix in 30% of the PID group and 26% of the FPC group (P = 0.8240 NS). Mycoplasma hominis was more prevalent in the vaginas and endocervices of the PID group than the FPC group (84% and 72% v. 50% and 42%; P = 0.0006 and 0.0047 respectively). Trichomonas vaginalis was present in 56% of the PID group and 20% of the FPC group (P = 0.0004). Syphilis serology was positive in 34% of the PID group and 10% of the FPC group (P = 0.0026). In the PID group of patients, 8% were positive for HB.Ag. Antibody to the human immunodeficiency virus was not detected in the PlO group and 10% of the FPC group (P = 0.0001 NS). Optimal microbiological information is obtained from the site of the infection. However, the performance of diagnostic laparoscopy for all patients with a clinical diagnosis of acute PID would be logistically and economically impractical at King Edward VIII Hospital, in view of the large patient numbers and limited facilities. Lower genital tract sampling cannot establish the aetiology of tubal infection with certainty, especially in respect of secondary bacterial invaders. However, lower genital tract sampling is non-invasive, cheaper and the yield of recognised sexually transmitted pathogens is highest from the cervix. Therefore it is more suited to the overstressed facilities at this hospital.

Since acute salpingitis is a sexually transmitted disease, one would expect to find a higher incidence of other diseases with known sexual transmission in these patients, e.g. trichomoniases, syphilis, and hepatitis B. The likelihood of exposure to the human immunodeficiency virus (HIV) also exists.

Acute pelvic inflammatory disease (PID) is a frequent disease of young women and is one of the most common reasons for admission to the gynaecological wards at King Edward VIII Hospital, Durban.

Patients and methods

The study was conducted between June 1986 and July 1987 on 100 patients attending King Edward VIII Hospital. The patients comprised two groups — 50 patients with clinical diagnoses of acute PID and 50 asymptomatic patients attending the family planning clinic (FPC). Only women between the ages of 16 years and 35 years were included in the study. The diagnosis of acute PID was made on a history of lower abdominal pain and the clinical findings of cervical motion tenderness and adnexal tenderness. Additional criteria for inclusion were peripheral blood white cell count of > 10.5 x 10⁹/l or a temperature of > 37.5°C.

Patients were excluded from the study if they had received antibiotics in the preceding 30 days, were using an intrauterine contraceptive device, had been delivered less than 3 months previously or had undergone any recent procedure involving cervical manipulation (e.g. hysterosalpingography, cone biopsy or curettage). Furthermore, as other workers have shown that acute PID is rarely associated with normal vaginal wet smear findings, patients with this finding on microscopic screening were also excluded.

The control group (women attending the FPC) were asymptomatic and had no past histories of acute PID. The same exclusion criteria were applied, with the exception that vaginal smear findings were not considered.

All specimens were collected before the start of any antimicrobial therapy. After general examination, each patient was placed in the lithotomy position and a sterile un lubricated Cusco's speculum passed into the vagina. Vaginal secretions
from the posterior fornix were collected on two sterile cotton-wool-tipped swabs. One was used for the preparation of a saline wet smear, which was examined microscopically for the presence of bacteria, inflammatory and epithelial cells, yeasts and motile trichomonads. This was done at the bedside within 10 minutes of collection. Vaginal wet smears were regarded as normal if rod-shaped bacteria resembling lactobacilli were the predominant organisms and epithelial cells outnumbered inflammatory cells, provided no clue cells, yeasts or trichomonads were present. The second vaginal smear was inoculated onto Shepards A-7 agar for the isolation of genital mycoplasmas. Inoculated A-7 agar plates were incubated anaerobically at 36°C for 48 hours and then examined microscopically (100 X magnification) for the presence of characteristic colonies of M. hominis and Ureaplasma urealyticum.

Endocervical specimens were collected after wiping the endocervix with one or two large sterile swabs to clear vaginal secretions. Sterile cotton-wool-tipped swabs were then carefully inserted into the cervical canal and firmly rotated to obtain cervical cells and any exudate. Separate swab specimens were also taken from the urethra and rectum. For each patient, one endocervical and the rectal and urethral swabs were inoculated onto modified New York City medium (MNYC) for the culture of N. gonorrhoeae and placed immediately in a candle extinction jar. These agar plates were transported to the laboratory within 30 minutes of collection and incubated at 36°C in an atmosphere of 10% CO₂ in air for 48 - 72 hours.

Colonies of N. gonorrhoeae were provisionally identified by colonial morphology and Gram staining and identity confirmed by carbohydrate tests. All isolates were tested for penicillinase production using chromogenic cephalosporin as substrate. An endocervical swab was also inoculated onto an A-7 agar plate, which was processed as described above. The third endocervical swab was used to prepare a smear for subsequent direct immunofluorescence staining for detection of C. trachomatis.

Venous blood was collected from each patient for the following serological tests: (i) all syphils-rapid plasma reagin (RPR) reactive sera were titred and subjected to confirmatory tests — Treponema pallidum haemagglutination test (TPHA) and the fluorescent treponemal absorption test (FTA-Abs); (ii) hepatitis B surface antigen (HBsAg) — radio-immunoassay; and (iii) antibodies to human immunodeficiency virus (HIV) — recombinant HIV enzyme-linked immunosorbent assay.

Statistics

Results were analysed using Pearson’s chi-square test and Fisher’s exact test (two-tail), with Yates corrected chi-square test when required. Usually a P-value of < 0.05 is regarded as significant. Because comparisons were performed on the same set of data, the critical level was adapted by dividing the level (0,05) by the number of comparisons, i.e. 10. Therefore any P-value < 0,005 is significant and any value between 0,05 and 0,005 has a strong indication of significance.

Results

Satisfactory specimens were obtained from all patients. Four patients with clinical diagnosis of acute PID were excluded, since they had normal vaginal wet smears. Two of these patients underwent laparotomy, 1 had appendicitis and 1 torsion of an ovarian cyst.

Clinical data

Patient data for age, parity, contraception usage, temperature and peripheral white cell count are shown in Table I. The mean age of patients in both groups was similar. There were 34 parous patients in the PID group and 44 in the FPC group. Differences in respect of contraceptive usage are evident. Of the symptomatic group, 35 patients (70%) were hospitalised for treatment on clinical grounds and the rest (15) were treated as outpatients. The majority of the PID group (44) had fever of > 37,5°C and 30 had a peripheral white cell count of > 10,5 x 10⁹/l.

<table>
<thead>
<tr>
<th>TABLE I. CHARACTERISTICS OF THE TWO GROUPS</th>
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<tbody>
<tr>
<td><strong>Acute PID</strong></td>
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<tr>
<td>Mean age (yrs) (range)</td>
</tr>
<tr>
<td>Parous (No.)</td>
</tr>
<tr>
<td>Contraception used</td>
</tr>
<tr>
<td>Progestosterone (depot)</td>
</tr>
<tr>
<td>Combined pill</td>
</tr>
<tr>
<td>None</td>
</tr>
<tr>
<td>Unknown</td>
</tr>
<tr>
<td>Temperature &gt; 37,5°C</td>
</tr>
<tr>
<td>White cell count &gt; 10,5 x 10⁹/l</td>
</tr>
<tr>
<td>Admitted for treatment</td>
</tr>
</tbody>
</table>

Microbiological data

An abnormal vaginal wet smear (inclusion criterion for symptomatic PID patients) was observed in 42% of FPC patients. The prevalence of Trichomonas vaginalis (56%) and M. hominis (84%) in the vagina was significantly higher in PID patients than in FPC patients (20% and 50% respectively). However, vaginal colonisation with U. urealyticum was similar in both groups (44% and 48%). These data are presented in Table II.

<table>
<thead>
<tr>
<th>TABLE II. RESULTS OF MICROSCOPIC AND MICROBIOLOGICAL INVESTIGATIONS OF VAGINAL SPECIMENS</th>
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<tbody>
<tr>
<td><strong>Acute PID</strong></td>
</tr>
<tr>
<td><strong>Positive</strong></td>
</tr>
<tr>
<td><strong>No.</strong></td>
</tr>
<tr>
<td>Abnormal wet smear</td>
</tr>
<tr>
<td>T. vaginalis</td>
</tr>
<tr>
<td>M. hominis</td>
</tr>
<tr>
<td>U. urealyticum</td>
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<td>*Admission criterion for PID group.</td>
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</table>

The results of investigations performed on cervical specimens are presented in Table III. N. gonorrhoeae was isolated from the endocervix of 31 PID patients (62%) compared with 5 (10%) of FPC patients, a significant difference. In no patient was this organism isolated from the urethra or rectum and not from the endocervix. A third of the total isolates (12 of 36) were penicillinase-producing strains. The prevalence of C. trachomatis in the endocervix was similar in both groups of patients, whereas cervical colonisation with M. hominis was significantly higher in PID patients (72% v. 42%). There was no significant difference in cervical colonisation with U. urealyticum in both groups of patients (22% and 36%).
Because lower genital tract infection is considered a prerequisite for sexually transmitted acute PID, the exclusion of patients with a normal vaginal wet smear has been shown to increase the accuracy of clinical diagnosis. Therefore, the presence of an abnormal vaginal wet smear was among the inclusion criteria for this study. However, the value of such screening has not been evaluated locally.

It has been agreed by most investigators that PID is a polymicrobial disease involving both sexually transmitted pathogens and endogenous micro-organisms. However, this study was directed towards the detection of common sexually transmitted pathogens such as *N. gonorrhoeae*, *C. trachomatis* and the genital mycoplasmas in patients with clinically diagnosed salpingitis.

Although oral contraceptive users have been shown to have a lesser risk of acquiring PID, this study compares the carriage of sexually transmitted pathogens in the lower genital tract in patients with acute PID and those without any symptoms of pelvic disease, i.e. family planning clinic attenders.

*N. gonorrhoeae* is obviously an important pathogen locally and was found in 62% of the PID group, a figure which is significantly higher than the 10% in the FPC control group. The latter prevalence is similar to previously reported prevalences of *N. gonorrhoeae* in gynaecology outpatients, and in antenatal clinic patients locally and elsewhere in South Africa. It is important to note that 12 (33%) out of the 36 *N. gonorrhoeae* isolates in this study were penicillinase-producing strains. Rates of up to 26.2% have been recorded in men presenting with acute gonococcal urethritis in Durban.

The isolation of *C. trachomatis* from the endocervices of both groups of patients was remarkably similar, namely 30% and 26%. Marth isolated *C. trachomatis* from the cervices of 19 (36%) of 53 Scandinavian women with acute salpingitis. However, local studies among men with acute gonococcal urethritis have shown an associated chlamydial infection in only up to 17% of patients. The trend evidenced from these and other studies is that in developing countries *N. gonorrhoeae* is a more common cause of urethritis than *C. trachomatis*, a direct contrast to the pattern described in developed countries. Further, the lower isolation rate of *C. trachomatis* compared with *N. gonorrhoeae* from the cervices of patients with acute PID reflects a relatively less prominent role of *C. trachomatis* as an initiator of PID in developing countries.

The prevalence of *M. hominis* in the vagina and endocervix in both groups is extremely high; 84% and 72% in the PID group and 50% and 42% in the FPC group. In Scandinavia, *M. hominis* was isolated from the endocervix in approximately 50% of patients with acute salpingitis. It has also been isolated from tubal specimens in patients with salpingitis, but has not been isolated from macroscopically normal tubes.

There was also a high prevalence of *U. urealyticum* in both groups studied. This organism is generally considered to be of minor significance in the aetiology of PID and sexually acquired urethritis. In studies of acute urethritis in men, ureaplasmal were isolated in 64,1% of patients, being coexistent with *N. gonorrhoeae* in the majority and rarely being the sole potential pathogen isolated. Collectively these findings support the view that *U. urealyticum*, although a commonly encountered genital organism in sexually active persons, is rarely of aetiological significance.

*Trichomonas vaginalis* can be demonstrated in some 20% of asymptomatic non-pregnant women at our hospital, as shown in 10 of 50 of the control (FPC) patients and in 20 of 100 women attending the diabetic outpatient clinic. The prevalence of trichomoniasis was significantly higher in the acute PID group (56%), which is in keeping with a similar high prevalence (42%) documented in patients complaining of a vaginal discharge attending the sexually transmitted disease clinic at the same hospital.

Screening for syphilis is essential in all sexually active women attending King Edward VIII Hospital and women with acute PID are a particularly high-risk group (prevalence 34%). A prevalence of 8% for HBsAg in the PID group is almost double that of nurses screened at this hospital (4,7%). Although no patients were positive for antibody to the HIV, the sample was too small to draw any reassuring conclusions.

Although this preliminary study provides important information to guide us in the treatment of our patients, it is no substitute for obtaining specimens from the site of the infection and such a study is at present being considered. On the basis of this study, it is, however, clear that empirical treatment for those sexually acquired pathogens most commonly encountered locally and recognised as being associated with acute PID. These include *N. gonorrhoeae*, *C. trachomatis* and *M. hominis*.

In view of the high prevalence of penicillinase-producing strains, routine use of agent(s) active against such strains is considered desirable. Previous studies on local isolates of *N. gonorrhoeae* have shown agents such as ceftriaxone, cefotaxime, cefuroxime, cefazidime and spectinomycin to be highly active against
penicillinase-producing strains. The Centers for Disease Control\textsuperscript{11} recommendation for gonococcal therapy in hyperendemic areas, such as ours, is the use of intramuscular ceftriaxone.

Finally, in order to reduce the possibility of re-infection, the need for appropriate and early treatment of sexual partners should be borne in mind.

REFERENCES