Aetiological Factors in Pelvic Inflammatory Disease in Urban Blacks in Rhodesia

I. McL. BROWN, J. G. CRUICKSHANK

SUMMARY
Pelvic inflammatory disease is the main reason for the admission of patients to the Obstetric and Gynaecology Unit at Harari Hospital. Some epidemiological and microbiological factors of the disease have been studied. Gonococcus was isolated infrequently from inpatients, but there appears to be a pool of potential pathogens, both aerobic and anaerobic, which are able to invade the upper genital tract under certain circumstances. Mycoplasmas were isolated from a high percentage of patients.


In many parts of Africa, pelvic inflammatory disease is the most common disorder encountered in obstetric and gynaecological wards. In 1973, 821 (44%) of a total of 1,850 admissions to the gynaecological ward at Harari Hospital were on account of pelvic inflammatory disease. It is not merely the number of patients with this disease which causes concern, but also the attendant high mortality and morbidity. The patient’s stay in the hospital is often protracted and her recovery complicated with recurrent attacks and the likelihood of infertility.

The purpose of the present study was to elucidate some of the bacteriological and epidemiological factors which may be important in the aetiology of the disease.

PATIENTS AND METHODS
Fifty patients with pelvic inflammatory disease who were admitted to the gynaecological wards were studied in detail. Patients who contracted infections after pregnancy were excluded from the study. All the patients who were studied had severe pelvic inflammatory disease, with either pelvic peritonitis or a pelvic mass. Any patient who was known to have received antibiotics during the week before admission was excluded from the study.

A detailed history was taken from each patient. Special emphasis was laid on sexual history and past episodes of pelvic infection.

Bacteriological studies were performed on swabs taken from each of the following: the urethra, lateral vaginal fornix and endocervix. Two swabs from each site were placed in Stuart’s medium for the culture of bacteria, while two were put into modified Stuart’s medium for the isolation of mycoplasma. If a mass presented in the pouch of Douglas, it was aspirated, and aliquots of the aspirate were placed in transport media, as formerly described.

The specimens were transferred to the laboratory within 2–4 hours, and were cultured for aerobic and anaerobic bacteria and mycoplasma.

One swab was used to make smears from Ziehl-Neelsen and Gram stains on sterile slides, to streak onto blood agar plates for aerobic and anaerobic culture, and to inoculate a cooked meat broth. The cooked meat culture was incubated overnight at 37°C, heated to 75°C for 10 minutes, plated onto blood agar and incubated aerobically for spore bearers.

The second swab was inoculated into a cooked meat medium containing 0.5% glucose and 7.5 µg/ml vancomycin and 100 µg/ml kanamycin. After 2 days’ anaerobic incubation at 37°C, subcultures were made onto kanamycin-vancomycin blood agar (for Bacteroides) and neomycin-vancomycin blood agar (for fusiformis). The plates were incubated aerobically for 5 days before being read.

One Mycoplasma swab was inoculated onto Mycoplasma solid medium containing thallium acetate at a final concentration of 1:2,000, and the other onto the same medium without thallium. Plates were incubated at 37°C in 5% CO₂ and 95% N₂ and examined after 3 days and 7 days. All isolates were confirmed by subculture.

Blood samples were taken in each case for venereal disease research laboratory (VDRL) testing.

A control group of 50 patients matched for age and parity was also studied. These were patients who attended the family planning clinic, or the gynaecological outpatients section, but who had no signs or symptoms of pelvic inflammatory disease.

RESULTS
Aspects of History
Age. There was no patient under 15 years old. Eighteen per cent were between 15 and 19 years old, 46% were between 20 and 24 years old, and the remaining 36% were over 25 years old.

Marital status. Fifty-two per cent of the patients were married, compared with 70% in the control group. Perhaps it is more important that all of the patients with pelvic sepsis and all but one of the control group were having regular intercourse.

Parity. Thirty-two per cent of the patients were nulliparous. The control group could not be used for com-
parison, since they had been matched for parity. However, this was compared with a second group of patients selected randomly at the outpatients department and matched for age only. In this group of patients the percentage of nulliparous women was 16%.

**Number of partners.** Thirty-eight per cent of the patients had more than 1 partner in the last 6 months. This compares with 16% in the control group. Twenty-seven per cent of the married women (and 47% of the single women) had more than 1 partner. These differences are not statistically significant.

**Age at first intercourse.** The average age at first intercourse in the patients with pelvic inflammatory disease was 15.7 years, while in the control group it was 17.1 years. This difference is significant at the 1% level.

**Frequency of intercourse.** In the patients with pelvic inflammatory disease, the frequency of intercourse was 3.5 times a week, and in the control group it was 3.4 times per week. This difference is not significant.

**History of past infection.** Fifty-four per cent of the patients had histories of previous episodes of pelvic infection. In the control series, 18% gave histories of what could be interpreted as previous pelvic infection. This difference is significant at the 5% level.

Of particular interest was the detailed history of past attacks. The patient would go to a private doctor rather than to a municipal clinic or hospital. She was usually treated with 'injections' or pills, but would not return for further treatment or continue the pills once she felt better.

**Microbiological Findings**

The organisms which were considered to be possible causative agents and which were isolated from the patients with pelvic inflammatory disease and from the control group are compared in Table I.

The other species isolated (Streptococcus viridans; haemolytic Streptococcus (not group A or D); Döderlein’s bacillus, Proteus species; Bacillus alkaligenes and lactose-fermenting enterobacteria other than Escherichia coli, micrococci and diphtheroids) were regarded as 'non-pathogens'.

**DISCUSSION**

The comparative importance of the various aetiological factors in pelvic inflammatory disease in our population remains uncertain. The bacteriological findings suggest that in the vagina there is a pool of organisms, both aerobic and anaerobic, which are potentially pathogenic, and which under certain circumstances will invade the upper genital tract.

It has long been assumed that the gonococcus is the primary invading organism in most cases, but in this series it was isolated in only 4% of cases. In other series from Africa, much higher pick-up rates for the gonococcus have been recorded. For example, Grech et al. in Uganda found a positive culture for gonococcus in 38.3% of patients with acute pelvic inflammatory disease who were admitted to Mulago Hospital. Even within our own population, a higher pick-up rate has been described within an asymptomatic population. Weissenerger and Robertson found an incidence of 11.6% in a random group of patients attending the family planning clinic.

There are two possible reasons for our failure to isolate the gonococcus. The first is that our collection-culture methods were inadequate. However, the swabs were placed directly into Stuart’s medium and were inoculated onto the selective medium for Gonococcus neisseria usually within 4 to 5 hours. Stuart’s medium has been shown to result in only a 5% loss of organisms over 12 hours, with an increased loss over this period of time.

The second possibility is that by the time the patient

**TABLE I. POTENTIALLY PATHOGENIC ORGANISMS ISOLATED FROM PATIENTS WITH PELVIC INFLAMMATORY DISEASE AND FROM CONTROLS (%)**

<table>
<thead>
<tr>
<th>Potential pathogens</th>
<th>Urethra</th>
<th>High vaginal swabs</th>
<th>Endocervix</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Patients</td>
<td>Controls</td>
<td>Patients</td>
</tr>
<tr>
<td><em>Escherichia coli</em></td>
<td>27</td>
<td>3</td>
<td>29</td>
</tr>
<tr>
<td><em>Streptococcus faecalis</em></td>
<td>37</td>
<td>0</td>
<td>38</td>
</tr>
<tr>
<td><em>Mycoplasma species</em></td>
<td>43</td>
<td>21</td>
<td>53</td>
</tr>
<tr>
<td><em>Candida albicans</em></td>
<td>27</td>
<td>9</td>
<td>33</td>
</tr>
<tr>
<td><em>Bacteroides</em></td>
<td>12</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td><em>Veillonella</em></td>
<td>11</td>
<td>3</td>
<td>14</td>
</tr>
<tr>
<td><em>Gonococcus</em></td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td><em>Anaerobic Streptococcus</em></td>
<td>5</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td><em>Clostridia welchii</em></td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><em>Fusiformis</em></td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
</tbody>
</table>
presents at the hospital, secondary invaders have taken over. Lip and Burgoyne\(^6\) have shown that the number of positive gonococcal cultures was inversely related to the duration of symptoms in their patients. This would seem to be the most likely explanation in our case, but to elucidate fully the role of the gonococcus we need to see and study patients when they first present to a doctor with signs and symptoms of the disease.

In the majority of patients *Escherichia coli* and *Streptococcus faecalis* were found, and these must be assumed to be the responsible organisms.

Anaerobic organisms were also present in both the group with sepsis and the control group. Of particular interest was the isolation of anaerobic organisms in 2 of 3 patients in whom an aspirate was obtained from the pouch of Douglas. Recently there has been considerable interest in the role of anaerobic organisms in pelvic infection,\(^7\)\(^8\) and it would appear that they may play an important part in this condition in our population.

The importance of *Mycoplasma* in nearly all the control patients and in 61.3% of the patients with pelvic inflammatory disease is difficult to assess. It is known that there is a high level of *Mycoplasma* infection in the sexually promiscuous\(^7\) and also in negroid patients.\(^8\) The mycoplasmas were not fully identified because the materials to distinguish *Mycoplasma hominis* from T strains were not available. Work is being continued to evaluate further the significance of the high level of colonisation with *Mycoplasma*.

There appears to be a particular group of patients who run a risk of developing severe pelvic inflammatory disease. They are between 20 and 24 years old, began their sexual experience at an early age, have had more than one partner in the previous 6 months, and have had several episodes of pelvic infection in the past. The latter aspect is of particular importance. More than half of the patients admitted to hospital have had attacks during the years before their admission. It would seem that repeated inadequate courses of antibiotics may predispose to the clinical pictures of chronic infection which we see so often.

The disease is more common in urban populations — figures for the admission to hospital of patients with pelvic inflammatory disease, are lower in rural areas. This corresponds to the findings regarding sexually transmitted disease in men, which is 3.6 times more common in an urban than in a rural population.\(^7\)\(^11\) Also in favour of the sexual transmission of the disease is the high level of positive VDRL results (33.3%).

The role of the male is probably of considerable importance. The patients in the series were reluctant or unable to reveal the sexual habits of their partners. Symington’s study\(^11\) has shown that 22% of married men in Salisbury were having extramarital intercourse. Men outnumber women in Salisbury by 2.4 to 1 (1969 census) and they are often separated from their wives. There seems little doubt that urbanisation leads to a breakdown of traditional morals, including those concerning sexual matters, and that this aggravates the problem of pelvic inflammatory disease.

REFERENCES