Prevalence of Neisseria gonorrhoeae infection in patients attending an antenatal clinic

N. C. WELGEMOED, A. MAHAFFEY, J. VAN DEN ENDE

Summary

Neisseria gonorrhoeae infection was diagnosed by culture using a selective medium (Thayer-Martin) in 140 (11.7%) of 1200 pregnant black women attending an antenatal clinic in 1981. The study confirmed the need for specimens from three sites (endocervix, urethra and rectum) — endocervical cultures were positive in only 75.9% of infected women, in the remainder only the urethral and/or rectal cultures were positive. Rectal cultures were positive in 41.6%. Cultures of throat swabs from 200 women were all negative for N. gonorrhoeae. In comparison with endocervical specimens directly plated, high vaginal swab specimens placed in Stuart's transport medium before plating gave a lower yield of positive cultures. No penicillinase-producing N. gonorrhoeae strains were detected.

Prevalence of Neisseria gonorrhoeae infection in patients attending an antenatal clinic

Gonorrhoea is one of the commonest sexually transmitted diseases, especially in developing countries. Although accurate figures are scanty, the available published data indicate a high prevalence of Neisseria gonorrhoeae infection in many African countries, including South Africa. The gonococcus has been shown to be the most common cause of acute urethritis in black South African males and it has long been recognized that, in contradistinction to the situation in men, uncomplicated N. gonorrhoeae infection may be asymptomatic in most women. Although pelvic inflammatory disease is common, especially in the black population, and is frequently attributed to underlying gonococcal infection, relatively little is known about the prevalence of N. gonorrhoeae infection in black women of childbearing age in South Africa.

The prevalence of N. gonorrhoeae infection in apparently healthy, pregnant black women attending an antenatal clinic is reported.

Patients and methods

The study population was made up of 1200 unselected pregnant women attending the Pelonomi Hospital antenatal booking clinic. They were predominantly black and were between 15 and 45 years of age. Each patient was investigated once only and the project extended over a period of several months in 1981, specimens for microbiological investigations being collected on one or two mornings a week.

Three specimens — endocervical, urethral and rectal — were obtained routinely from each patient in a standard manner. An endocervical specimen was obtained with a cotton-tipped swab under direct vision, after passage of a sterile vaginal speculum with sterile water only as a lubricant. The swab was passed approximately 1 cm into the endocervix and rotated slowly for a few seconds to allow for absorption of secretions. After removal of the speculum a thin calcium alginate-tipped swab (Calgiswab type I, Ino lex) was passed into the urethra for approximately 1 cm and moved slowly from side to side before removal. The rectal specimen was obtained by inserting a cotton-tipped swab into the anus for approximately 3 cm, and blindly sweeping the tip peripherally against the mucosa. In addition, cotton-tipped throat swab specimens were obtained from the last 200 women investigated.

Blood specimens were collected routinely for the performance of serological tests for syphilis (STS). In order to assess the reliability of a high vaginal swab in transport medium for the diagnosis of gonorrhoea, one high vaginal specimen was collected with a cotton-tipped swab from each of 480 women in addition to the three routine specimens.
Bacteriological methods

All endocervical, urethral, rectal and throat specimens were plated within minutes of collection. Each swab was inoculated onto a pre-warmed plate of modified Thayer-Martin medium (MTMM) consisting of blood agar base No. 2 (Oxoid), 10% lysed horse blood and vancomycin (3 mg/l), colistin (7,5 mg/l), nystatin (12,5 mg/l) and trimethoprim (5 mg/l).

Inoculated plates were placed in candle-extinction containers to provide an increased carbon dioxide atmosphere. These were in turn placed in polystyrene insulated containers to minimize heat loss during transport to the laboratory, where they were incubated at 36°C for up to 72 hours.

Plates were initially examined for growth after 48 hours' incubation. Colonies suspected of being N. gonorrhoeae were subjected to testing for oxidase production and Gram-staining. Oxidase-positive, Gram-negative diplococci were presumptively identified as N. gonorrhoeae. The majority of these presumptive isolates were subjected to confirmatory tests including carbohydrate utilization and coagglutination with polyvalent antiserum (Phadebact Gono-coccus Test).

N. gonorrhoeae isolates were tested for β-lactamase production using chromogenic cephalosporin (Nortrocin, Glaxo Research) as substrate.

Each high vaginal swab was broken off into 8 ml of Stuart's transport medium (Oxoid) in a bijou bottle. This was kept at ambient temperature in the laboratory for a period of at least 4 hours before the swab was inoculated onto MTMM and incubated and processed as described above.

The following STS were performed: all sera were screened initially by the rapid plasma reagin test (RPR). Titres were determined for all RPR-positive sera using the Venereal Disease Research Laboratory test (VDRL) and the Treponema pallidum haemagglutination test (TPHA) was performed as a confirmatory test. The fluorescent treponemal antibody test with absorption (FTA-abs) was only performed when the TPHA on RPR/VDRL-positive sera gave negative or doubtful results.

A positive TPHA or FTA-abs was interpreted as confirmed seropositivity for syphilis.

Results

Prevalence of infection

N. gonorrhoeae was isolated from one or more of the three routine sites cultured in 137 (11,4%) of the 1200 women investigated. None of the 200 throat cultures was positive for N. gonorrhoeae.

The results of the analysis of the positive cultures by site are shown in Tables I and II. Endocervical cultures were positive in 104 (8,7%) of the total number of cultures. The fluorescent treponemal antibody test with absorption (FTA-abs) was performed as a confirmatory test. The fluorescent treponemal antibody test with absorption (FTA-abs) was only performed when the TPHA on RPR/VDRL-positive sera gave negative or doubtful results.

A positive TPHA or FTA-abs was interpreted as confirmed seropositivity for syphilis.

TABLE I. RESULTS OF CULTURES FOR N. GONORRHOEAE FROM THREE SITES (ALONE AND IN COMBINATION) FOR 1200 ANTEnatal PATIENTS

<table>
<thead>
<tr>
<th>Specimen site</th>
<th>N. gonorrhoeae</th>
<th>% of total infections</th>
<th>% of total investigated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Endocervix only</td>
<td>36</td>
<td>26,3</td>
<td></td>
</tr>
<tr>
<td>Endocervix + urethra</td>
<td>33</td>
<td>24,1</td>
<td></td>
</tr>
<tr>
<td>Endocervix + rectum</td>
<td>8</td>
<td>5,8</td>
<td></td>
</tr>
<tr>
<td>Endocervix, urethra + rectum</td>
<td>27</td>
<td>19,7</td>
<td></td>
</tr>
<tr>
<td>Urethra only</td>
<td>11</td>
<td>8,0</td>
<td></td>
</tr>
<tr>
<td>Rectum only</td>
<td>17</td>
<td>12,4</td>
<td></td>
</tr>
<tr>
<td>Urethra + rectum</td>
<td>5</td>
<td>3,6</td>
<td></td>
</tr>
<tr>
<td>Total infected</td>
<td>137</td>
<td>99,9</td>
<td>11,4</td>
</tr>
</tbody>
</table>

Transport medium

Only the results of the routine endocervical cultures and the cultures of the high vaginal specimens in transport medium were compared.

Of the 480 specimen sets, N. gonorrhoeae was isolated from 47 (9,8%) of the routine endocervical cultures and 36 (7,5%) of the high vaginal specimens in transport medium. Thus the transport medium specimens yielded 23,4% (11/47) less positive cultures than the routine endocervical cultures, although an additional 3 N. gonorrhoeae infections were detected by the high vaginal specimens.

Therefore if all specimens are taken into consideration the total number of women with culture-proven N. gonorrhoeae infection increases to 140 out of 1200, yielding a prevalence of 11,7%.

STSs were positive in 250 (20,8%) of the total number of patients, 26,4% of the 140 with N. gonorrhoeae infection and 20,1% of those culture-negative for N. gonorrhoeae.

Discussion

This investigation reveals an alarmingly high prevalence of N. gonorrhoeae infection (11,7%) among the predominantly black antenatal patients studied and confirms the major public health importance of this sexually transmitted disease in South Africa.

Finlayson et al. reported an overall prevalence of 5,3% for N. gonorrhoeae infections among antenatal and gynaecology patients in their large survey of coloured women in the Western Cape in 1974. In a smaller Zimbabwean survey among urban black women attending gynaecology, antenatal and family planning clinics in Harare, Weissenberger et al. recorded an overall prevalence of gonococcal infection of 9,7%. Among the 100 patients attending a family planning clinic the prevalence was 12%. This figure is similar to the 10,2% prevalence among black women attending an antenatal clinic in Johannesburg reported by Hall and Whitcomb in 1978 and the 10% reported from Durban in 1981.

Osoba recently reviewed the situation regarding sexually transmitted diseases in Africa. The documented prevalence of gonorrhoea varies from 2,9% in family planning clinics in
Swaziland to over 17% in parts of East Africa. Clearly gonorrhoea is a common, if poorly reported, infection in South Africa.

In men the diagnosis of gonorrhoea is usually straightforward, the vast majority of cases providing positive results by microscopic examination of Gram-stained smears of urethral exudate. In the female, reliable cultural diagnosis is much more important; diagnosis by means of Gram-stained smears is not considered sufficiently reliable.14

This study also confirms the need to take specimens for culture from multiple sites when investigating women for N. gonorrhoeae infection.16,17 Reliance on a single directly plated endocervical culture alone will fail to detect approximately one-quarter of infected women. Thus urethral and rectal cultures should be performed in addition. In this study 8.0%, 12.4% and 3.6% of infected women were positive for N. gonorrhoeae at the following sites: urethra only, rectum only, and urethra plus rectum respectively, in the face of negative endocervical cultures. Direct visualization was not employed during collection of rectal specimens, since published data indicate that blind anorectal swabs are reliable in the diagnosis of rectal gonorrhoea.16

The reason for the high positivity rate for rectal culture in this study is unclear, since rectal intercourse is apparently rarely practised in the population group studied. The high prevalence of rectal N. gonorrhoeae infection may be related to the presence of vaginal discharge which is common in these patients.

Although only a single set of cultures was examined for each woman in this study, Barlow et al.17 have clearly shown, in a study based on examination of up to three repeated sets of cultures taken at separate visits, that 97% of cases of N. gonorrhoeae infection are diagnosed on the first set of investigations.

A high vaginal swab sent to the laboratory in Stuart's transport medium provided a 23% lower yield than a single directly plated endocervical specimen, which means that reliance on only a high vaginal specimen sent in transport medium would result in an unacceptably low (about 60%) detection rate for N. gonorrhoeae infection.

The high prevalence of N. gonorrhoeae in the patient group studied is in keeping with prevalences reported from other African countries. This high prevalence and the recognized morbidity and complications of N. gonorrhoeae infections in women inevitably provoke the question of the need for routine antenatal screening for N. gonorrhoeae infection. Screening for syphilis is accepted practice although the indications are somewhat different. Routine screening for N. gonorrhoeae infection would need considerable laboratory and other support and could not be divorced from efforts to diagnose and control the other sexually transmitted diseases which are also all too common in South Africa.18

The support of the Central Research Committee and Department of Obstetrics and Gynaecology of the University of the Orange Free State is gratefully acknowledged.

REFERENCES