Comparison of Dacron-Tipped Applicator and Cytobrush for Detection of Chlamydial Infections

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Endocervical samples were obtained from 435 females for Chlamydia detection by using both a Dacron swab and a cytobrush. Positive results were obtained from 35 swabs and 34 cytobrush specimens. All specimens positive with the cytobrush were detected also with swab samples. The cytobrush and Dacron swab appear to be comparable for the detection of endocervical infections with Chlamydia trachomatis.

Chlamydia trachomatis infections are among the most prevalent of all sexually transmitted diseases (STD) in the United States (7). Although infection in women is often asymptomatic, the organism has been implicated in acute cervicitis, urethral syndrome, salpingitis, pelvic inflammatory disease, and perihepatitis (Fitz-Hugh and Curtis syndrome) (1). In the past, laboratory diagnosis of chlamydial infections required growth of the organism in cell culture; this is the reference standard for evaluating other methods but is costly and time consuming. The new rapid fluorescent-antibody (FA) tests allow rapid processing of specimens and are highly specific; however, the sensitivity, compared with that of cell culture, varies between 61 and 96%, depending on the population studied (2, 4, 9). A major difference in sensitivity between these two methods has been attributed to sampling error in patients with infections characterized by low numbers of elementary bodies (5).

Recently, an endocervical brush (Zelsmyr Cytobrush International; Cytobrush, Inc., Hollywood, Fla.) has been developed for obtaining cytology specimens for Papanicolaou smears which has been shown to increase the yield of endocervical cells for cytologic analysis compared with the cotton-tipped swab (6, 8). The purpose of the present study was to determine whether the use of the cytobrush improved the detection of C. trachomatis from the endocervix by one of the FA methods.

Specimens were obtained from patients attending a local family planning clinic (n = 99), from patients attending an STD clinic of the Olmsted County Department of Public Health in Rochester, Minn. (n = 100), and from those patients referred to the Department of Obstetrics and Gynecology at the Mayo Clinic for Chlamydia testing because of symptoms or signs of a lower genital tract infection or as part of an initial evaluation for infertility (n = 236) from September 1986 to March 1987.

All samples were obtained by the physicians and nurse practitioners of the Department of Obstetrics and Gynecology at the Mayo Clinic, the family planning clinic, and the Olmsted County Department of Public Health. Each Mayo Clinic patient was sampled for C. trachomatis after a specimen was obtained for a Papanicolaou smear. In the family planning clinic, Chlamydia sampling was performed after a specimen was collected for a Papanicolaou test and, if indicated, after culture for Neisseria gonorrhoeae. In the STD clinic, Chlamydia sampling was performed directly after obtaining a wet preparation for Trichomonas vaginalis.

Two samples for Chlamydia testing were collected from each patient, one by using the Dacron cotton-tipped swab supplied in the FA test kit (Syva MicroTrak) and the other by using the cytobrush. The first sample taken from each patient was determined by drawing an unmarked, sealed envelope from a randomized set containing a card indicating which device to use first. Slides were labeled to identify the method of sampling. After collection of the samples, all slides were fixed with acetone (methanol fixation was recommended by the manufacturer after study was completed) provided in the FA collection kit and were forwarded to the virology laboratory of the Mayo Clinic. Upon arrival, all slides were fixed by immersion in water-free acetone for 10 min and subsequently air dried. Smears were then stained with 1 drop (approximately 30 μl) of the MicroTrak fluorescein-conjugated monoclonal antibody and incubated for 15 min at 37°C. Slides were gently rinsed in deionized water, air dried, and mounted with a cover slip. Slides were then coded so that the identity of the slide was unknown at the time of examination. The entire well from each specimen was examined at ×1,000 magnification (oil immersion) for 5 to 10 min by using a Reichert Microstar IV epifluorescence microscope. A positive result was recorded when 10 or more apple green, evenly fluorescing, smooth-edged, disk-shaped elementary bodies, comparable in appearance to the organisms in the control slide, were seen. Smears were also graded on the basis of the number of elementary bodies seen: <10, negative; 10 to 49, grade I; 50 to 99, grade II; and ≥100, grade III.

Positive results were reported in 13 (13%), 18 (18%), and 4 (1.7%) of the patients attending the family planning clinic, the STD clinic, and the Mayo Clinic Department of Obstetrics and Gynecology, respectively. Of the combined 35 positive results from all three groups, the cytobrush detected 34 of the 35 (97%) positive swab samples, and the swab detected 100% of the positive cytobrush samples (Table 1). One patient had a positive swab sample and a cytobrush sample which was read as negative because only 5 elementary bodies were seen.

Each of the positive samples was graded on a scale of I to III as previously described. In 28 of the 35 (80%) positive samples, the grade assigned to the swab sample was equal to that of the cytobrush sample (Table 2). In the remaining 7 patients, the swab and cytobrush sample grades differed, but

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neither sampling device produced consistently superior results.

This study suggests that there is little difference between the Dacron swab and the cytobrush in detecting the presence of chlamydial organisms in the endocervix when using the Syva MicroTrak FA detection system. Lindner et al. (3) compared the simultaneous use of the endocervical swab, cytologic scraper, and endocervical cytobrush for preparing smears for immunofluorescence staining of Chlamydia organisms and found that both the cytobrush and the endocervical swab detected 100% of their 50 positive cases. However, these authors also reported that the use of the cytobrush yielded a subjectively higher number of organisms than did use of the swab. This contrasts with our study, in which 80% of the positive samples had equal grades assigned to the swab and the cytobrush, suggesting that the cytobrush is roughly comparable to the swab in the number of organisms recovered. In the remaining 20%, the instrument used to obtain the first sample produced the higher grade in no more than half of the samples; i.e. there appeared to be no obvious order effect due to sequential sampling. These results suggest that the cytobrush performs no better than the swab and does not justify the added cost of cytobrush samples.

In a recent abstract, Boughton et al. (R. B. Boughton, Jr., S. Cox, K. Forrest, J. Findlay, and B. Judson, Program Abstr. 27th Intersci. Conf. Antimicrob. Agents Chemother., abstr. no. 724, 1987) reported a significant increase in the number of positive MicroTrak specimens (P < 0.05) with the use of the cytobrush compared to use of the swab. Unfortunately, these authors did not describe the study design or present quantitative data, so a comparison with our study was not possible.

Because samples obtained by cytobrush for cervical cytolology contain more cells than those obtained by swab, there was concern that cytobrush smears would be thicker and more difficult to read than those prepared with the swab. The number of cells in endocervical specimens obtained by either the swab or cytobrush was not quantitated; however, slides were classified as thick if at least one half of the specimen area contained multiple layers of cellular and associated material. Interestingly, thick smears composed only 16% of cytobrush-prepared smears, compared with 15% of those prepared by using the swab. Furthermore, most of the thick smears had originated from the same clinic, suggesting that technique is more important than the choice of instrument in preparing a satisfactory smear.

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**LITERATURE CITED**


**TABLE 1. Comparison of swab and cytobrush results**

<table>
<thead>
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<th>Cotton swab result</th>
<th>No. of results with cytobrush</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Positive</td>
</tr>
<tr>
<td>Positive</td>
<td>34</td>
</tr>
<tr>
<td>Negative</td>
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</table>

* Only five elementary bodies were seen on the cytobrush sample.

**TABLE 2. Comparison of positive swab and cytobrush specimens by grade**

<table>
<thead>
<tr>
<th>Swab grade*</th>
<th>No. of positive specimens with cytobrush grade**</th>
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</thead>
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<tr>
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</tr>
<tr>
<td>II</td>
<td>1</td>
</tr>
<tr>
<td>IIIb</td>
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</table>

* Number of positive specimens for grade: grade I, 10 to 49; grade II, 50 to 99; grade III, >100.
** One grade III swab was cytobrush negative.