Involvement of *Gardnerella vaginalis* in Urinary Tract Infections in Men

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Fifteen male patients from whose urine samples *Gardnerella vaginalis* was isolated (clinical incidence of 0.1%) were evaluated for clinical signs and symptoms of urinary tract infection and modality of acquisition of the organism. Ten of 15 (67%) patients were symptomatic or had signs of inflammation as manifested by an increased number of urinary neutrophils. One patient had two bouts of infection caused by this organism which required two courses of antibiotic therapy. Colonies of diphtheroid-like organisms found in urine cultures should not be ignored as insignificant but should be further investigated to determine whether *G. vaginalis* is present.

*Gardnerella vaginalis*, formerly called *Haemophilus vaginalis* and *Corynebacterium vaginalae*, is a facultative anaerobic, nonmotile, pleomorphic gram-negative to gram-variable rod (21). It is a well-recognized colonizer of the female genital tract (4, 10, 24). The most common disease that this organism may cause is bacterial vaginosis (7, 9, 24), but serious diseases such as bacteremia (16, 20, 22, 25) and meningitis (2) have been reported. In males, the finding of this organism has, up to now, not been considered clinically significant (3, 5, 13) and has been only uncommonly reported as a cause of urethritis or prostatitis (1, 17) or urinary tract infection (UTI) (12, 26).

Our laboratory has been reporting *G. vaginalis* at an increasing frequency in the urine samples submitted by men for routine bacteriological culture. With the availability of commercial systems capable of identifying *G. vaginalis* in 4 h, many organisms previously reported as diphtheroids are now identified and reported as *G. vaginalis* (6). The significance of a urine culture positive for *G. vaginalis* is unknown. Whether the organism should be considered a pathogen or only a colonizer in these patients and whether these patients have a predisposition for this organism were investigated.

For a period of 6 months, all reports on routine cultures submitted to the Microbiology Laboratory were reviewed, and a list of male patients in whom *G. vaginalis* grew was kept. Urine specimens from patients who had been treated for UTIs, from patients with signs and symptoms of UTI, from patients with underlying diseases associated with an increased frequency of UTIs, and from older patients with obstructive prostate disease were submitted for culture. Urine cultures were performed by inoculation onto Trypticase soy agar with 5% sheep blood and MacConkey and Columbia CNA agars (Becton Dickinson Microbiology Systems, Cockeysville, Md.), and plates were incubated at 35°C in 5 to 10% CO₂ for 48 h. Colony counts were determined by quantitative subculture of 1 μl onto the blood-agar plate, with isolates of 10⁵ CFU/ml being further identified. Slowly growing colonies of gram-variable rods generally requiring 48 h for good growth were subcultured on V agar containing human blood (Becton Dickinson Microbiology Systems), and plates were incubated at 35°C for 24 h. *G. vaginalis* isolates will grow after overnight incubation on V agar and will have beta-hemolysis (23). All such isolates were identified as *G. vaginalis* by the RapID NH System (Innovation Diagnostics, Inc., Atlanta, Ga.), a system which is used to identify *Neisseria* and *Haemophilus* species. The medical records of the patients with *G. vaginalis* isolated were reviewed.

During the 6-month period, *G. vaginalis* was isolated from urine samples from 15 patients. Thirteen of the patients were seen in the Medical, Genitourinary, or Hypertension Clinic and two patients were seen in the Infectious Disease Clinic. Seventeen urine cultures from the 15 patients were positive for *G. vaginalis*, representing 0.1% (17 of 12,400) of the urine cultures submitted during the period of observation. All positive cultures had colony counts of more than or equal to 10⁵ CFU/ml, and only *G. vaginalis* was isolated from the positive cultures. The presence of organisms such as *H. influenzae*, *Chlamydia spp.*, anaerobes, and mycobacteria, however, cannot be ruled out. A summary of the 15 cases is provided in Table 1.

Ten of the 15 patients had complaints associated with UTI or signs of UTI such as dysuria, hematuria, frequency of urination, and increased numbers of urinary leukocytes (small stream was excluded as an infection symptom since it could reflect only chronic structural changes). The ages of the patients ranged from 30 to 89 years, with the majority being older than 50 years. One of the 10 patients had no sensation in the genitals because of an underlying neurologic deficit. This patient and six symptomatic patients had elevated numbers of leukocytes in their urine samples (>5 leukocytes per high-power field). Five had erythrocytes in their urine samples. The urine pHs ranged from 5.0 to 6.5. Only two of the patients had peripheral blood leukocytosis. No patient had an increased percentage of band forms. Only one patient (patient 9) had an elevated level of creatinine in his serum (3.6 mg/dl). Five patients were noted to have histories of UTIs involving other bacteria. Four of the seven patients with urine leukocytosis were given antibiotics such as metronidazole, amoxicillin, doxycycline, ciprofloxacin,
TABLE 1. Summary of cases*

<table>
<thead>
<tr>
<th>Patient no.</th>
<th>Age</th>
<th>Underlying disease</th>
<th>Sexual activity</th>
<th>Signs and symptoms</th>
<th>Leukocytes in urine (no. per HPF)</th>
<th>Antimicrobial therapy</th>
<th>Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>58</td>
<td>Past UTI, PUD, NIDDM, hypertension</td>
<td>No</td>
<td>Hematuria, prostate enlargement</td>
<td>5-10</td>
<td>None</td>
<td>No reculture</td>
</tr>
<tr>
<td>2</td>
<td>53</td>
<td>Hypertension</td>
<td>No</td>
<td>None</td>
<td>0-5</td>
<td>None</td>
<td>No reculture</td>
</tr>
<tr>
<td>3</td>
<td>44</td>
<td>Spinal cord injury, neurogenic bladder hypertension</td>
<td>No</td>
<td>None</td>
<td>0-5</td>
<td>None</td>
<td>No reculture</td>
</tr>
<tr>
<td>4</td>
<td>54</td>
<td>Diverticulosis, NIDDM, hypertension</td>
<td>Yes</td>
<td>Frequency, inability to ejaculate</td>
<td>0-5</td>
<td>None</td>
<td>No reculture</td>
</tr>
<tr>
<td>5</td>
<td>66</td>
<td>Bladder cancer</td>
<td>No</td>
<td>Urgency</td>
<td>5-10</td>
<td>None</td>
<td>No reculture</td>
</tr>
<tr>
<td>6</td>
<td>64</td>
<td>Past UTI, abdominal aneurism</td>
<td>No</td>
<td>Hematuria, dysuria</td>
<td>10-20</td>
<td>SXT</td>
<td>Responded; no reculture</td>
</tr>
<tr>
<td>7</td>
<td>39</td>
<td>Past UTI, past gonorrhea</td>
<td>Yes</td>
<td>Dysuria, frequency</td>
<td>20-30</td>
<td>Two courses of amoxicillin + Reculture once, responded once</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>45</td>
<td>HIV Ab positive, Trichomonas UTI</td>
<td>Yes</td>
<td>Hematuria, dysuria</td>
<td>10-30</td>
<td>Metronidazole</td>
<td>Responded; no reculture</td>
</tr>
<tr>
<td>9</td>
<td>65</td>
<td>Meningioma</td>
<td>Yes</td>
<td>None</td>
<td>&gt;25</td>
<td>None</td>
<td>No reculture</td>
</tr>
<tr>
<td>10</td>
<td>68</td>
<td>Hypertension, CVA</td>
<td>Yes</td>
<td>Small stream</td>
<td>0-5</td>
<td>Ciprofloxacin</td>
<td>Reculture</td>
</tr>
<tr>
<td>11</td>
<td>50</td>
<td>Diabetes mellitus, hypertension</td>
<td>Yes</td>
<td>None</td>
<td>1-5</td>
<td>None</td>
<td>No reculture</td>
</tr>
<tr>
<td>12</td>
<td>73</td>
<td>Prostate enlargement, PUD</td>
<td>No</td>
<td>Dysuria, frequency, flank pain</td>
<td>Many</td>
<td>Doxycycline, ciprofloxacin + Reculture, – reculture</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>89</td>
<td>Hypertension, diabetes mellitus</td>
<td>No</td>
<td>Chronic frequency</td>
<td>1-5</td>
<td>Metronidazole</td>
<td>Responded; no reculture</td>
</tr>
<tr>
<td>14</td>
<td>30</td>
<td>None</td>
<td>Yes</td>
<td>Dysuria</td>
<td>0-5</td>
<td>SXT</td>
<td>Responded; no reculture</td>
</tr>
<tr>
<td>15</td>
<td>67</td>
<td>Hypertension</td>
<td>No</td>
<td>Small stream</td>
<td>1-5</td>
<td>None</td>
<td>No reculture</td>
</tr>
</tbody>
</table>

* Abbreviations: HPF, high-power field; PUD, peptic ulcer disease; NIDDM, non-insulin-dependent diabetes mellitus; HIV Ab, human immunodeficiency virus type 1 antibody positive; CVA, cerebral vascular accident; SXT, sulfamethoxazole-trimethoprim. Symbols: –, negative; +, positive.

and sulfamethoxazole-trimethoprim. All patients receiving therapy responded clinically (patients 6, 7, 8, 10, 12, 13, and 14). A urine culture from patient 7 (from the Infectious Disease Clinic) was positive only for *G. vaginalis*, and patient 7 had symptoms of dysuria and urgency. He was treated for 10 days with oral amoxicillin (2 g/day), and the symptoms resolved. Two months later, he had dysuria again, and *G. vaginalis* was again recovered from the patient's urine. He was again treated with oral amoxicillin, with resolution of symptoms. Eight of 15 patients had become asymptomatic or had remained asymptomatic, and antibiotic therapy was never initiated with these patients. Unfortunately, urine cultures to determine the length of *G. vaginalis* colonization were not performed for any of these eight patients.

*G. vaginalis* has been known to preferentially colonize the female genital tract (4, 10, 24). Two explanations have been offered. First, prostatic fluid contains high concentrations of zinc, which may be inhibitory, and second, prostatic lining contains columnar or cuboidal epithelial cells that may resist adherence of *G. vaginalis* (15). Nevertheless, carriage in the genitals of healthy men has been reported at rates of 7.2% (15) and 11.4% (5) and carriage in seminal fluids has been reported at a rate of 38% (11) when the specimens were specifically cultured for this organism. In addition to the possible hostility of the male genital tract environment for this organism, the urine itself may be bactericidal for the organism. Lam et al. (14) found that *G. vaginalis* counts declined by 99.9% in urine held at 37°C for 24 h at pH 7.0. Pyuria was not uniformly present in our patients (present in 7 of 15) and therefore could not be reliably used as an indicator of infection. The lack of an inflammatory response to *G. vaginalis* has also been reported by other investigators who isolated *G. vaginalis* from bladder aspirates of patients who were pregnant and of patients with underlying renal disease (8, 19). These factors may play a role in the lack of isolation of this organism from the urine of male patients.

When the mode of acquisition of *G. vaginalis* was investigated, 6 of the 15 men (40%) reported sexual contact with a woman within 48 h prior to collection of the urine cultures. These individuals may have acquired the organism during direct sexual contact with the female partner. These data support the conclusions of earlier investigators in that the acquisition of *G. vaginalis* does occur through sexual contact (4, 16, 18). Whether sexual acquisition is important was further studied by Holst (10). Male partners of females with bacterial vaginosis and from whom *G. vaginalis* was initially isolated from the urethra and who used condoms during sexual intercourse did not have *G. vaginalis* reisolated. Holst (10) concluded that *G. vaginalis* and Mobiluncus spp. transiently colonized the genital tracts of healthy males as a result of continued passive acquisition from their female partners. On the other hand, 9 of 15 patients in our study clearly denied any sexual contact with a female from 1 month to several years prior to our obtaining the positive urine cultures. In these cases, the organism may have been part of their own bacterial floras, although previous studies have shown that this occurs infrequently (10).

Our data indicate that *G. vaginalis* may play a role in causing UTI in at least 67% of the male patients from whom it was isolated. Therefore, we encourage microbiology laboratories to examine slowly growing diphtheroidlike organisms and to determine whether *G. vaginalis* is present. In order to clarify the causative role of *G. vaginalis* in UTIs in men, more clinical observations are needed.
REFERENCES