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SIMULTANEOUS OCCURRENCE OF NEISSERIA GONORRHOEAE, CANDIDA ALBICANS, AND TRICHOMONAS VAGINALIS

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Abstract. Three hundred and ninety-nine patients attending the out-patient clinic of the Department of Dermatology and Venereology, Rigshospital, Copenhagen, for various venereal complaints during a three months' trial were examined. Gonorrhoea was found in 164 patients. The simultaneous occurrence of *Candida albicans* and *Trichomonas vaginalis* was compared with the findings in 235 patients without gonorrhoea. The occurrence of *T. vaginalis* was found in a significantly higher proportion of female patients with gonorrhoea (27 of 75) than in female patients without gonorrhoea (16 of 88). *C. albicans* occurred with the same frequency in female patients with and without gonorrhoea, being present in 33 of 75 patients with gonorrhoea and in 27 of 88 patients without gonorrhoea. *T. vaginalis* was found in 4, and *C. albicans* in 2 of 236 male patients.

The incidence of gonorrhoea has increased rapidly in recent years (1, 5, 6). In many countries a similar rise is observed in vaginal candidiasis incidence and this condition is diagnosed more frequently (8). *Candida albicans* now seems to have replaced *Trichomonas vaginalis* as the commonest cause of genital symptoms in women (3). Use of oral contraceptive pills is probably the most frequent cause of this change in the ratio of *T. vaginalis* to *C. albicans* (4, 10). However, it still remains unknown to what extent the inflammatory changes of the genital mucosa brought about by an acute gonococcal infection favours infections with *C. albicans* and *T. vaginalis*.

In order to elucidate this problem, we have studied the simultaneous occurrence of *C. albicans* and *T. vaginalis* in male and female patients with acute gonorrhoea and the results have been compared with those obtained in a group of patients without gonorrhoea.

MATERIAL AND METHODS

Three hundred and ninety-nine consecutive patients were examined for various venereal complaints during a three months' trial. They were all patients attending the out-patient clinic of the Department of Dermatology and Venereology, Rigshospital, Copenhagen. One hundred and sixty-four had gonorrhoea and 235 patients without gonorrhoea served as controls.

Each patient underwent a clinical venereological examination after a case history had been obtained. Urethral and cervical smears were examined by direct microscopy for gonococci. Cultures for gonococci from urethral, cervical, and rectal specimens were performed at the Neisseria Department, Statens Seruminstitut, Copenhagen. The specimens were transported in modified Stuart medium on charcoal-impregnated swabs (9); the transportation time did not exceed 24 hours. Direct microscopy for yeast was performed on KOH-treated smears and wet preparations in saline were examined by direct microscopy for *T. vaginalis*. Yeast cultures were made at 37°C on Sabouraud medium containing penicillin and streptomycin in the department's mycological laboratory. Trichomonas cultures were made in Diamond's medium at Statens Seruminstitut and the specimens were transported in the same way as the specimens sent for culture for gonococci (7).

Patients with gonorrhoea were treated with a single injection of aqueous benzyl penicillin (5 mega units). Half an hour earlier, an oral dose of 1 g of probenecid was given. Female patients were checked at weekly intervals three times after treatment, while male patients were checked twice. Male and female patients without gonorrhoea were examined at least twice. Patients revealing *C. albicans* and/or *T. vaginalis* were left untreated throughout the observation period.

RESULTS

Table I gives the age distribution of the patients studied during the 3 months' trial. The microorganisms isolated from these patients are listed in Table II and the occurrence of *C. albicans* and/or *T. vaginalis* in female patients with and without gonorrhoea is shown in Table III. The occurrence of *T. vaginalis* in female patients with gonorrhoea was significantly more frequent than in the group of female patients without gonorrhoea ($p < 0.025$).

Table I. *Age distribution of 164 male and female patients with gonorrhoea and 235 control patients*

	Males		Females	
Age (years)	Gonorrhoea	Control	Gonorrhoea	Control
14	0	0	0	1
15–19	7	19	19	24
20–24	34	62	35	42
25–29	33	32	16	13
30–39	14	25	4	5
40–49	1	9	1	3
Total	89	147	75	88

T. vaginalis was isolated in 27 of 75 patients with gonorrhoea while in 16 of 88 without gonorrhoea (Table III). By contrast, *C. albicans* occurred with the same frequency in female patients with and without gonorrhoea, being present in 33 of 75 with gonorrhoea and in 27 of 88 without gonorrhoea ($p > 0.05$). A striking difference in incidence of *T. vaginalis* and *C. albicans* was observed. In both groups of female patients *T. vaginalis* was found constantly at each examination, whereas *C. albicans* was detected irregularly and showed no pattern of appearance at all. Treatment of the gonococcal infection neither influenced the course of *T. vaginalis* infestation nor the pattern of appearance of *C. albicans*.

T. vaginalis was found in 4, and *C. albicans* in 2 out of 236 male patients (Table II). One of the patients with *T. vaginalis* and one with *C. albicans* had gonorrhoea.

DISCUSSION

The results of the present clinical study indicate that the inflammatory changes in the genital mucosa brought about by an acute gonococcal infection does not favour the appearance of *C. albicans*, since this organism was found with the same frequency and irregularity in patients with and without gonorrhoea. Accordingly, gonorrhoea is not included in the list of factors favouring development of vaginal candidiasis published by Catterall (3). The gonococcal infection in our study had no influence on the course of infestation with *T. vaginalis*. The symptoms were unchanged throughout the whole period of study, independent of treatment for gonorrhoea, and the trichomonads were regularly found at each control examination. However, *T. vaginalis* did appear more frequently among the female patients with gonorrhoea than in the control group, thus supporting the general concept that trichomoniasis and gonorrhoea often coincide in the same patient.

Catterall (2), in a study on vaginal discharge, found *T. vaginalis* in 45 of 95 women with gonorrhoea. The common coincidence of gonorrhoea and trichomoniasis is also supported by Wisdom & Dunlop (11). Among 513 cases of trichomoniasis, gonorrhoea was present in 155 (30%) and moniliasis in 29 (6%).

In our study, the ratio of infestation with *T. vaginalis* to that with *C. albicans* was 1 to 1.5, considering the whole group of female patients (Table III). This is in agreement with Catterall (3), who in 1969 found a ratio of 1:3 in a group of patients with genital symptoms and a ratio of 1:2 in patients with vaginal discharge.

In the same paper (3), Catterall points out that these ratios from 1969 were completely different from those in 1965, when the ratio of vaginal trichomoniasis/candidiasis was 2:1 among all women complaining of genital symptoms and 3:1 among

Table II. *Occurrence of Neisseria gonorrhoeae, Trichomonas vaginalis and Candida albicans in specimens from 236 male and 163 female patients*

	Positive specimens from 236 male patients		Positive specimens from 163 female patients	
Microorganism	*n*	%	*n*	%
N. gonorrhoea	89	38	75	46
T. vaginalis	4	—	43	26
C. albicans	2	—	60	37

Table III. *Occurrence of Candida albicans and Trichomonas vaginalis in 75 female patients with gonorrhoea and 88 female patients without gonorrhoea*

	C. albicans		T. vaginalis		C. albicans + T. vaginalis	
	n	%	*n*	%	*n*	%
Gonorrhoeal (total = 75)	25	33	19	25	8	(11)
Non-gonorrhoeal (total = 88)	23	26	12	14	4	(5)
Total (163)	48	29	31	19	12	(7)

those complaining of vaginal discharge. The results of the present study support the general view that *C. albicans* has replaced *T. vaginalis* as the commnest cause of genital symptoms in females.

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