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The Diagnosis of Candida Vaginitis in General Practice

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In a multi-practice study, 29 general practitioners registered 361 women with increased vaginal discharge, malodour, or pruritus, and 229 women without vaginal complants. A wet-smear was examined for *Candida* by the general practitioner. Culture for *Candida* was performed in the general practitioner's laboratory, and at a microbiological laboratory. *Candida* was found by microscopy or culture in 140 (39%) women with vaginal symptoms, compared with 51 (22%) without vaginal complaints ($p<0.001$). In 34 women with symptoms (24%) *Candida* was found by wet-smear microscopy, in 98 (76%) by microscopy or culture in the general practitioner's laboratory, and in 126 (90%) by microscopy or culture at the microbiological laboratory. No relation was found between the number of *Candida* isolated and the presence of vaginal symptoms ($p>0.05$). The sensitivity of microscopy was low compared with previous studies and underlines the need for multi-practice studies in the evaluation of diagnostic procedures. Vagicult is recommended for general practice, but problems exist in the interpretation of a positive culture result.

Key words: Candida, vaginitis, diagnosis, microscopy, culture, general practice.

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Infection with *Candida* is a widespread cause of vaginal symptoms, known for more than a century (1). However, *Candida* is isolated not only in women with vaginal symptoms, but also in asymptomatic patients. In the interpretation of a positive culture in patients with vaginal symptoms it is therefore important to know the isolation-rate in patients without vaginal complaints.

The classical symptoms of vaginal candidiasis are pruritus and vaginal discharge, and the chief signs are erythema of the vaginal mucosa and white, curdy vaginal secretion (2). Many cases of vaginal candidiasis are diagnosed in general practice on clinical grounds alone (3). Microscopic identification improves the diagnostic reliability and is considered sufficient by some authors (4, 5), while others recommend culture-based diagnosis (6).

Recommendations are usually based on the author's personal experience, or they rely on studies by one or a few investigators with special interest and training in the diagnostic procedures in question. However, results obtained under these circumstances do not necessarily apply to everyday routine. It is therefore important to conduct multipractice studies under realistic conditions in order to establish a firm basis for recommendations of diagnostic procedures.

The aims of this study were: 1) to estimate the isolationrate of *Candida* in women with and without vaginal complants and to relate the number of *Candida* to the presence of symptoms. 2) to estimate the reliability of symptoms and signs in the diagnosis of *Candida* vaginitis, and,) to compare wet-smear microscopy for *Candida* with culture performed in general practice and at a microbiological laboratory.

MATERIAL AND METHODS

The investigation was conducted as a multi-practice study and included 29 general practitioners (GPs) in the county of Aarhus, Denmark. Each GP was asked to enrol 15 consecutive patients with increased vaginal discharge, malodour or pruritus, and, as a control group, 10 concecutive women with no vaginal complaints who were going to have a pelvic examination performed for other reasons. After ob-

Table I. *The presence of* Candida *in women with and without vaginal symptoms identified by three methods: microscopy at the GP laboratory, and culture at the microbiological laboratory.*

	+symptoms (n=361)	−symptoms (n=229)
Diagnostic method	n (%)	n (%)
Microscopy		
+	34 (9)	9 (4)
−	327 (91)	220 (96)
GP laboratory		
+	13 (4)	3 (1)
+	20 (6)	9 (4)
+++	52 (17)	17 (7)
−	266 (74)	200 (87)
Microbiological laboratory		
+	24 (7)	13 (6)
++	13 (4)	6 (3)
+++	76 (21)	25 (11)
−	248 (69)	185 (81)

taining their informed consent each woman underwent a standardized procedure, including history and pelvic examination. Women under the age of 18, pregnant women, women menstruating or expecting menstruation within the next eight days, and women treated with antibiotics within the previous 14 days were excluded.

During pelvic examination, the amount and consistency of the vaginal discharge was evaluated by the examining doctor. The pH of the vaginal discharge was measured with a paper indicator (Merck, narrow range 4.0–7.0). A wet mount was examined by bright field microscopy at 400 × magnification for the presence of *Candida*.

Specimens for culture of *Candida* were obtained by charcoal cotton-tipped swabs from the posterior fornix of the vagina and transported in Stuart's medium to the State Serum Institute, Copenhagen.

The swab for detection of yeast was plated onto Sabouraud maltose agar and incubated at 36°C for three days. The number of colony-forming units was estimated semiquantitatively and scored + (1–10), ++ (11–30), and +++ (>30). Individual morphologically different colonies were streaked on cornmeal agar and incubated for three days at 25°C (7). The plates were examined daily for the occurrence of chlamydospores, differentiating *Candida albicans* from other yeast species. Since the majority of yeasts isolated were *Candida albicans* or other *Candida* species, the term *Candida* in this report includes all yeasts found.

One swab with vaginal secretion from the posterior fornix of the vagina was used for culture of *Candida* in the GP's laboratory. The swab was inoculated in Vagicult – a liquid medium containing trypticase to which sheep serum, penicillin, and streptomycin are added. After incubation at 37°C for 24 hours *Candida* was demonstrated by microscopy, and the number of *Candida* in 3 fields at 400 × magnification was registered: + (1–5), ++ (6–30), +++ (>30).

The study was approved by the ethics committee of the county of Aarhus.

Statistics

Statistical analyses were performed with Fishers's test, Chi-square test with Yates' correction, and test for trend (8).

RESULTS

A total of 361 women complaining of vaginal discharge and 229 women who had a pelvic examination for other reasons (e.g. contraception or PAP-smear) were included in the study. The difference between the expected and the observed number of

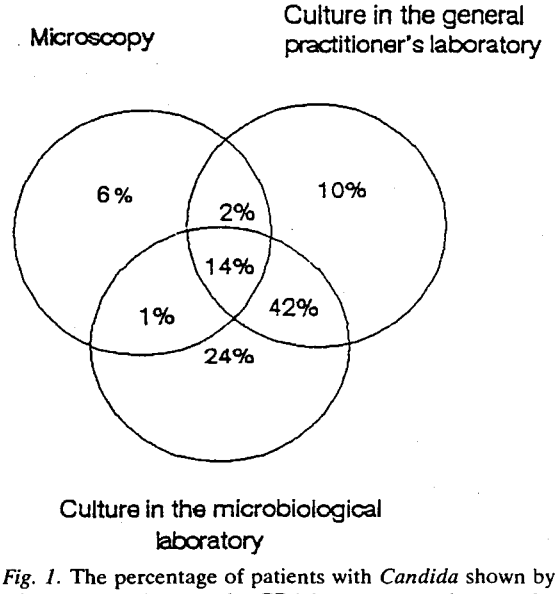

Fig. 1. The percentage of patients with *Candida* shown by microscopy, culture at the GP laboratory or culture at the microbiological laboratory (n=140).

Table II. *The isolation of* Candida *in relation to the presence of itching, inflammation of the vaginal mucosa, white + curdy discharge, and pH < 4.5 in women with vaginal discharge (n=361).*

Clinical findings	*+Candida n (%)*	*−Candida n (%)*
Itching		
+ (n=201)	109 (54)	92 (46)
− (n=160)	31 (19)	129 (81)
	χ^2=45.6, p<0.001	
Inflammation		
+ (n=114)	65 (57)	49 (43)
− (n=247)	75 (30)	172 (70)
	χ^2=22.2, p<0.001	
White+curdy		
+ (n=29)	23 (79)	6 (21)
− (n=332)	117 (35)	215 (65)
	χ^2=20.0, p<0.001	
pH		
> 4.5 (n=109)	57 (53)	51 (47)
< 4.5 (n=153)	83 (33)	170 (67)
	χ^2=11.9, p<0.001	

women in the study was due to withdrawal from the study of some of the doctors during the study period. The mean age of the patients was 28.7 years (SD=3.8), and of the controls 30.9 years (SD=9.7).

Table I shows that *Candida* was found by microscopy in 9% of the women with vaginal symptoms compared with 4% in the control group (χ^2=5.5; p<0.05), while 26% and 13%, respectively, had positive *Candida* culture in the GP's laboratory) (χ^2=14.9; p<0.001). Culture at the microbiological laboratory showed *Candida* in 31% of the patients and in 19% of the controls) (χ^2=9.9; p<0.01). Using a positive result from any of the three methods *Candida* was found in 140 women (38.8%) with vaginal symptoms, compared with 51 (22.3%) in the control group (χ^2=16.7; p<0.001).

In women found positive at the GP's laboratory, no relationship was found between the number of yeasts and the presence of vaginal complaints (test for trend: χ^2=0.05; p>0.05). Likewise, the semi-quantitative evaluation made at the central laboratory did not differ between the patient and control groups (test for trend: χ^2=0.92; p>0.05).

At the microbiological laboratory 93 (82%) of the yeasts from patients were *Candida albicans*, compared with 29 (66%) in the controls (χ^2=4.91; p<0.05).

In Fig. 1 the agreement of wet-smear microscopy, culture at the GP's laboratory, and at the microbiological laboratory is shown in Venn-diagram. If the diagnosis was based solely on microscopy, 76% of the positives found by the other techniques would have gone undetected. When microscopy and culture in the GP's laboratory were both used, 24% were undetected, and only 10% were missed when microscopy was combined with culture at the microbiological laboratory.

Table II shows the predictive value of selected symptoms and signs (itching, inflammation of the vaginal mucosa, presence of white curdy discharge, and pH > 4.5) for the presence of *Candida* in women with vaginal discharge. All symptoms and signs were strongly associated with the presence of *Candida*. The presence of white and curdy discharge had the highest predictive value for the presence of *Candida* (79%), whereas the absence of itching had the strongest predictive value for the absence of *Candida* (81%).

DISCUSSION

The prevalence of *Candida* varies in different populations and in a review by Odds (9) isolation-rates between 23% and 75% were found in patients with vaginal discharge. The isolation-rate of *Candida* in the present study agrees with other studies from general practice in which *Candida* was isolated in 13–48% of patients with vaginal symptoms and in 5–21% without vaginal symptoms (10, 11).

Candida is regarded as an opportunistic pathogenic microorganism by most authors (12, 13, 14). As a consequence of its frequent isolation in asymptomatic women it will also be present in many women with vaginal complaints, without being the cause of the symptoms. It has not yet been possible to discriminate between women in whom *Candida* is causing symptoms and those in whom *Candida* is present as an apathogenic microorganism.

As in the present study, *C. albicans* has been isolated more frequently than other yeast species in symptomatic compared with asymptomatic patients (15), thus indicating that *C. albicans* is probably more virulent than other yeasts. The strains of *C. albicans* isolated in women with vaginal symptoms do not differ from those found in asymptomatic women (1).

It is generally believed that symptomatic infection only results when *Candida* is present in large concen-

trations (2). This belief has gained support from studies in which *Candida* was present only in small numbers in asymptomatic women, compared with women with vaginal symptoms (16). Oriel et al. (6) did not find such a relationship, and nor has the present study confirmed it.

In accordance with several hospital-based studies (6, 17), as well as from general practice (18, 19), symptoms and signs in the present study were related to the isolation of *Candida*, but they were not reliable predictors of its presence. Many patients with *Candida* vaginitis would remain undiagnosed, while patients without *Candida* would receive unnecessary treatment, if diagnosis was made on clinical grounds alone.

When microscopy has been performed by a single or few trained microscopists, sensitivity of microscopy between 60% and 75% has been found (4, 17). In the evaluation of diagnostic procedures, special interest and skill of the investigators makes generalizations difficult. The participation in the present study of 29 GPs without special interest or training in the diagnosis of vaginal candidiasis explains the low sensitivity of microscopy, and stresses the importance of studies to evaluate clinical procedures in everyday practice.

As the clinical and microscopic diagnoses of *Candida* vaginitis are unreliable, culture is necessary to ensure the diagnosis. Culture at the microbiological laboratory was the most sensitive diagnostic method (Fig. 1), but culture in the GP's laboratory using Vagicult proved only a little less sensitive, and is a quick and cheap alternative method. As with microscopy, special training and experience also influence the results obtained with culture in the GP's laboratory, and in a study by Schødt et al. (20) culture in the GP's laboratory with Vagicult was even more sensitive than culture at the central laboratory.

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