

# Use of slide latex agglutination test for rapid diagnosis of vaginal candidosis

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**SUMMARY** A new slide latex agglutination test was compared with microscopy and culture for diagnosing vaginal candidosis in 367 women attending a genitourinary medicine clinic. Vaginal candidosis occurred in 10% of the patients, and 7% had commensal carriage of *Candida* spp. The slide latex agglutination test was superior to microscopy in immediate diagnosis and was rapid and simple to perform. Of the patients with vaginal candidosis, 72% were detected by slide latex agglutination test compared with 38% by microscopy. The test discriminated well between patients yielding cultures of *Candida* spp who had symptoms and signs and those who showed commensal carriage.

## Introduction

Vaginal candidosis is the most commonly reported genital infection in women attending genitourinary medicine and sexually transmitted disease clinics.<sup>1</sup> In Britain in 1983 almost 50 000 cases of candidosis were reported. The immediate diagnosis of vulvovaginal candidosis is based on symptoms and signs usually supplemented by microscopical examination of vaginal smears. Microscopy alone is a relatively insensitive aid to diagnosis, and several reports showed only 36% to 43% correlation with candidosis.<sup>2-4</sup> The development of a slide latex agglutination test for detection of candidal antigens has provided an alternative method for diagnosing vaginal candidosis,<sup>5</sup> and we have previously evaluated this test in a laboratory setting.<sup>4</sup> We wished to extend our observations by using this rapid test in a clinic and evaluating its performance against conventional diagnostic criteria.

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## Patients and methods

The study population consisted of 367 consecutive women attending the department of genitourinary medicine at the General Infirmary, Leeds, in July and August 1985. A standard history was recorded, and genital examination performed. Special attention was paid to symptoms of itching and soreness, signs of vulvovaginitis, mucosal oedema, and the presence and nature of vaginal discharge. Investigations included serological tests for syphilis, culture for *Neisseria gonorrhoeae*, *Trichomonas vaginalis*, and *Chlamydia trachomatis*, and cervical cytology. Vaginal specimens were directly inoculated, using a 10 µl loop, on to Sabouraud's dextrose agar containing chloramphenicol (0.05 g/l) and incubated at 37°C. Yeasts that developed at 24 and 48 hours were identified using the germ tube test<sup>6</sup> and the API 20C Aux Yeast Identification System (API Laboratory Products, Basingstoke, England). The quantity of yeast recovered in culture was recorded as the number of colony forming units. Vaginal smears were examined after staining by Gram's method and also by phase contrast microscopy.

## SLIDE LATEX AGGLUTINATION TEST

The candidal test latex reagents consisted of polystyrene latex particles coated with purified immunoglobulins derived from a rabbit antiserum

raised against partially purified cell wall fractions of *Candida albicans* serotypes A and B and *Candida glabrata* (*Torulopsis glabrata*).<sup>4</sup> The sensitivity of the test latex reagent, determined against *C. albicans* serotype A cell wall mannan<sup>7</sup> diluted in glycine buffered saline (GBS) pH 8.2, was 25 ng/ml.

The slide latex agglutination test reagents consisted of a candidal test latex and a negative control latex coated with preimmune rabbit gammaglobulins. Specimens were taken with a swab (Culturette, Marion Scientific, Kansas City, USA) from the lateral vaginal walls of the women. Each swab was immersed in 400 µl of GBS contained in a small tube, left to stand for 30 seconds, and then squeezed out into the buffer. The swab was discarded, and the residual fluid used for testing.

A drop of candidal test latex was placed in one demarcated area of a black-backed glass slide, and a drop of control latex was placed in an adjacent area. One drop (50 µl) of vaginal specimen in GBS was added to the test and control latex and mixed for 15 seconds with a wooden applicator stick. The slide was gently rocked for 90 seconds and observed for agglutination.

The incorporation of a negative control was useful, and about 5% of vaginal specimens gave non-specific reactions with both test and control latex. *Candida* spp were not recovered from any of the women who gave this non-specific reaction with the latex, and these results were included as negative in the analysis of results. We found that an observation time of 90 seconds was most useful, as more samples showed fine granularity or other non-specific changes if observation was prolonged.

#### ANALYSIS OF DATA

The diagnostic investigations that were compared in this study comprised microscopy of vaginal specimens, conventional culture on Sabouraud's agar, and the slide latex agglutination test. To make valid comparisons, it was necessary to define the condition vaginal candidosis. Differing views on its definition exist,<sup>8</sup> but in this study characteristic symptoms of candidosis were taken to be pruritis and soreness, and typical signs were vulvitis, vaginitis, and vaginal discharge. Patients with these symptoms or signs in whom microscopy or culture gave positive results were defined as having vaginal candidosis; patients without symptoms or signs whose cultures for *Candida* spp were positive were regarded as having commensal carriage. This was considered to reflect the most widely accepted current view of the dual role of *Candida* spp as pathogens and commensals in the vagina.

Microscopy and slide latex agglutination were compared for their sensitivity, specificity, predictive

value positive, predictive value negative, and efficiency in diagnosing vaginal candidosis.

#### Results

A total of 367 women were evaluated on 371 occasions in July and August 1985. None of the women had been treated for candidosis in the recent past. Cultures for *Candida* spp were positive in 63 of 371 presentations; an incidence of 17%. In 37 (59%) of 63 patients with positive cultures there was clinical evidence of candidosis. Thus 10% of the study population had vaginal candidosis and 7% carried *Candida* spp as commensals.

The slide latex agglutination test gave positive results on 37 occasions. In 30 of these instances candidal cultures were positive concurrently, in two women cultures were negative but had been positive seven days previously, and on five occasions (four patients) there was no evidence of *Candida* spp. The diagnoses for these four patients were gonorrhoea, chlamydial infection, non-specific genital infection, and no abnormality detected. The slide latex agglutination test was much more commonly positive in women with candidosis than in those with commensal carriage. Of the 30 women yielding positive slide latex agglutination test results and culture for *Candida* spp, 28 (93%) had signs and symptoms of candidosis. Table I shows the full results, including those of microscopical examination of vaginal smears. Two patients with signs and symptoms of candidosis who were positive on microscopy, were slide latex agglutination and culture negative.

The most useful observation from these data was the effectiveness of the slide latex agglutination test compared with microscopy in diagnosing vaginal candidosis. Table II shows that the slide latex agglutination test was almost twice as sensitive as microscopy in detecting vaginal candidosis. Its overall efficiency was also superior to that of microscopy.

We also compared the quantity of yeasts isolated with the results of the slide latex agglutination test (table III). Consistently more colonies of yeast were isolated from women with a positive slide latex agglutination test result than from those with a negative

TABLE I Comparison of microscopy, slide latex agglutination (SLA) test, and culture in 371 patient visits

Diagnosis	No	Microscopy		SLA test		Culture	
		+	-	+	-	+	-
Vaginal candidosis	39	15	24	28	11	37	2
Commensal carriage	26	2	24	2	24	26	0
Negative	306	3	303	7	299	0	306

+ = positive, - = negative test results.

TABLE II Comparison of microscopy and slide latex agglutination (SLA) test in the diagnosis of vaginal candidosis

	Microscopy	SLA test
Sensitivity (%) $\left(\frac{a}{a+b} \times 100\right)$	38.5	71.8
Specificity (%) $\left(\frac{d}{c+d} \times 100\right)$	98.5	97.3
Predictive value positive (%) $\left(\frac{a}{a+c} \times 100\right)$	75.0	75.7
Predictive value negative (%) $\left(\frac{d}{b+d} \times 100\right)$	93.2	96.7
Efficiency (%) $\left(\frac{a+d}{a+b+c+d} \times 100\right)$	92.2	94.6

a = No with vaginal candidosis and positive results on microscopy (15) or SLA (28).

b = No with vaginal candidosis and negative results on microscopy (24) or SLA (11).

c = Total with commensal carriage or negative for *Candida* spp and positive results on microscopy (5) or SLA (9).

d = Total with commensal carriage or negative for *Candida* spp and negative results on microscopy (327) or SLA (323).

slide latex agglutination test result. This reflects the fact that larger numbers of yeasts were recovered from patients with candidosis than from those with commensal carriage.

## Discussion

The diagnosis of vaginal candidosis is based on history and examination and is usually supplemented by either microscopy or culture of vaginal specimens, or both. The definition and criteria for diagnosing cases of vaginal candidosis, however, vary substantially.<sup>9</sup> This reflects differing views as to whether *Candida* spp may be commensal in the vagina or are always associated with some morbidity.<sup>8</sup> We and many others think that when women are routinely tested by culture, the isolation of *Candida* spp is not always associated with clinical presentations and signs.<sup>3,4,10</sup>

In this study a new slide latex agglutination test was assessed in a busy genitourinary medicine clinic. The test was carried out by examining doctors and was rapid and simple to perform. The test was useful for

diagnosis, and its sensitivity was high (72%) compared with that of microscopy (39%). The result of the slide latex agglutination test was available immediately, and was useful for managing patients. The slide latex agglutination test discriminated well between patients with vaginal candidosis and those whose subsequent cultures of *Candida* spp suggested commensal carriage.

The study also confirmed the association noted in our previous work between the quantity of yeast recovered and the patient's clinical status.<sup>4</sup> The greater the quantity of yeast recovered the more likely was the patient to have symptoms and signs related to candidosis. The slide latex agglutination test was also more likely to give positive results when greater quantities of yeast were isolated and thus may be "load sensitive".

This study showed that a slide latex agglutination test that detects soluble cell wall antigens of *Candida* spp is useful in diagnosing vaginal candidosis. It is easy to perform, requires only a small amount of bench space, and needs no specialised equipment. Agglutination of the latex is clearly visible and takes place in as little as 10 seconds in some samples, though a gradual and progressive change in one to one and a half minutes is more usual. Slide latex agglutination is superior to microscopy in immediate diagnosis. It could be used as a useful adjunct to current methods, and would be specially useful where immediate microscopy is not available.

TABLE III Quantity of yeast isolated on culture compared with result of slide latex agglutination (SLA) test

No of yeast colonies in culture	No of patients with positive SLA test result (n = 30)	No of patients with negative SLA test result (n = 33)
> 200	7	0
30-200	5	3
10-29	17	14
< 10	1	16

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