Evaluation of a Candle-Jar System in Culture Diagnosis of Gonorrhoea

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Abstract. A commercially available candle-jar system for direct inoculation in the culture diagnosis of gonorrhoea was compared with the conventional system using Stuart transportation medium and inoculation in the laboratory. Accuracy and cost were the two aspects studied. The candle-jar system was found to be superior in situations where extended transportation time was unavoidable. The advantages found were increased yield of positive cultures and a reduction in cost per specimen.

Diagnosis of N. gonorrhoea infections is dependent on optimal conditions for transportation of the specimens as well as on optimal media and procedures for cultivation. This is especially important for specimens from female patients, as there appears to be an increasing incidence of patients with asymptomatic gonorrhoea (4).

In this report a modified candle-jar system is compared with conventional procedures as regards ease of handling, incidence of positive cultures, and cost.

Table I. *Results of gonococcal cultures with use of candle-jar technique, incubated within 20 min and of parallel conventional technique by use of STM cultivated after 6–20 hours*

	Candle-jar	Conventional
Total number of specimens investigated	650	650
Number of positive cultures	29	23

Table II. *Quantitative growth of gonococci using a candle-jar system compared with conventional procedures using STM cultivated after 6–20 hours*

Number of gonococcal colonies per half-plate	Candle-jar	Conventional
More than 100	19	4
10–100	5	6
1–10	2	7
0	–	9
Total number of positive cultures	26	17
Total number of specimens investigated	375	375

MATERIAL AND METHODS

Patients. Specimens were taken from patients attending the Department of Venereal Diseases, Gävle sjukhus, for suspected STD over a period of 3 months. A total of 1 284 consecutive specimens were taken.

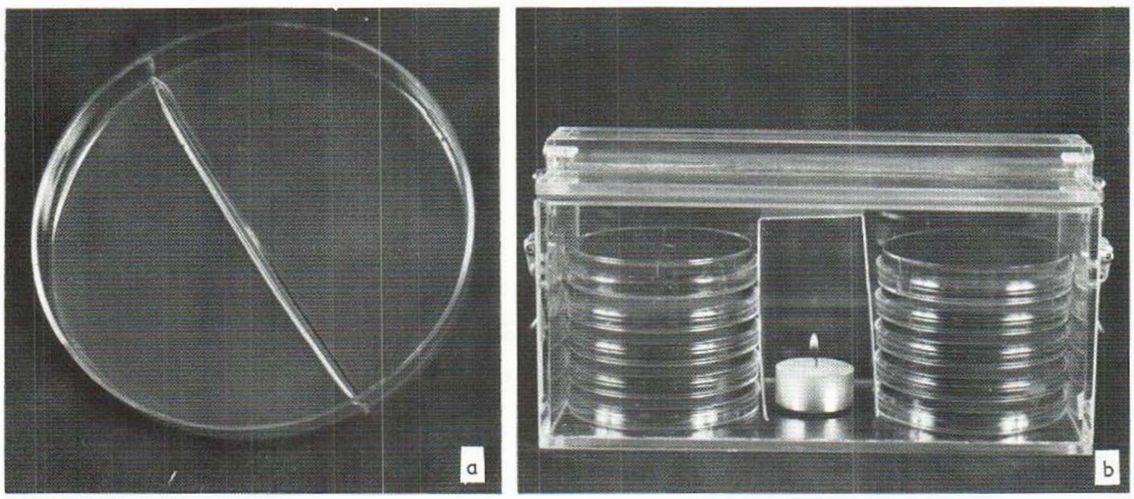

Fig. 1. (a) Divided gc plate with VCN inhibitor added to one half. *(b)* Candle-jar with inoculated plates inside.

Table III. *Number of cultures with heavy overgrowth of bacteria or yeasts in specimens inoculated direct and incubated using the candle-jar system, compared with conventional procedure with STM cultivated after 6–20 hours*

Growth of more than 10⁸ colonies per half-plate	Candle-jar		Conventional	
	Without VCN inhibitor	With VCN inhibitor	Without VCN inhibitor	With VCN inhibitor
Enterobacteria	32	4	72	34
Swarming Proteus sp.	2	0	0	0
Yeasts	13	13	14	19
Total number of specimens heavily contaminated incidence (%)	47 (18.1)	17 (6.6)	86 (33.2)	53 (20.5)
Total number of specimens investigated	259		259	

Media. A modified Stuart transportation medium (STM), earlier investigated (2) and then repeatedly checked for quality, was used in the conventional procedure. A Columbia agar base with additions of horse blood and horse serum as described earlier (1, 3) was used for the culture medium in both conventional and candle-jar procedures.

The price for medium per culture with the conventional procedure was STM (2.50 Sw Kr) + Columbia agar plates with and without VCN inhibitor added (1.95+1.70 Sw Kr)=6.15 Sw Kr. The price for medium with the candle-jar procedure was 2.30 Sw Kr (Fig. 1).

Cultivation procedures. All specimens were taken by charcoal-coated cotton swabs from the male urethra, and from the female urethra, endocervix and rectum, and then immediately inoculated onto divided gc plates with or without added VCN inhibitor (see Fig. 1). All swabs were then inserted into STM (Biotest HB, Sollentuna) and kept at +4°C until transported to the laboratory. On arrival, all specimens were cultivated at once and, in the latter part of the investigation, daily after 2–6 days at room temperature, simulating prolonged transportation time. All plates were placed in a candle-jar, designed by us and manufactured by Biotest HB. The candle was lit and the jar was immediately incubated at 37°C at the STD clinic. After 16–24 hours, the candle-jars were transported to the laboratory and then reincubated for another 24 hours. The plates were then read and positive gonococcal cultures were confirmed according to current laboratory techniques.

RESULTS

The results of parallel direct incubation in candle-jars and by means of the conventional STM followed by culture on the same media after 4–20 hours are shown in Table I. The incidence of positive gonococcal cultures after transportation in STM was 80 per cent (23 vs. 29) of the candle-jar cultures.

The quantitative growth of gonococcal colonies per plate was roughly estimated for the next 375 consecutive specimens. The results are shown in Table II. With the candle-jar system there was a much higher yield per plate. In 259 of these specimens, the numbers of contaminating coliform bacteria, swarming Proteus sp. and yeasts, were estimated (Table III). The number of plates with heavy growth of contaminating bacteria was far higher with the conventional procedure: enterobacterial overgrowth was found on 72 plates without and on 34 with VCN inhibitor, as compared with 32 and 4, respectively, in parallel candle-jar cultures.

In the last 375 consecutive specimens the STM swabs were also cultivated daily after 1–6 days at room temperature. As is shown in Table IV, there was a sharp decline of positive cultures after 48 hours when the conventional procedure yielded only 10 vis-à-vis 26 positive cultures obtained with the candle-jar technique.

DISCUSSION

Direct inoculation of specimens on plates for gonococcal cultures in candle-jars has been shown

Table IV. *Number of positive gonococcal cultures in conventional procedures using STM, cultivated after 1–6 days at room temperature, as compared with candle-jar system*

	Candle-jar	Stuart transportation medium cultivated after				
		1 d.	2 d.	3 d.	4 d.	6d.
Number of positive cultures	26	17	10	4	1	1
Total number	375			375		

to give an increased number of positive cultures (1) and fewer cultures with heavy bacterial overgrowth. The results of this investigation were confirmative, further substantiated by the lower quantitative yield of gonococci per plate with the conventional procedure.

Our results confirm earlier findings (2) reporting that with extended transportation time there is an increased risk of contaminating overgrowth, resulting in false-negative cultures. We therefore suggest that in situations where the transportation time exceeds a few hours, the candle-jar system with primary inoculation and incubation at the STD clinic is the technique of choice. This method is also far more economical as the cost for the conventional procedure exceeds the candle-jar technique by 3.85 Sw. Kr per specimen (as regards cost for the medium used). If the time spent on registration and cultivation with the conventional procedure—not necessary with the candle-jar technique—is also taken into consideration, then the candle-jar procedure is far and away better from the cost-saving point of view.

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