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Diagnosis of gonorrhoea in women

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SUMMARY The results of Gram stains and cultures from 145 women with uncomplicated ano-genital gonorrhoea are presented. The site which gave the highest yield of gonococci was the cervix. Equally good results were obtained with Stuart's transport medium and direct plating in the clinic. Positive results from rectal specimens alone were obtained from 8·4% of the 119 women in whom the rectum was examined. In 89 women the results of rectal specimens taken through a proctoscope were compared with those of swabs passed blindly up the anal canal. When Stuart's transport medium was used swabs taken through a proctoscope gave better results than the swabs taken blindly; the latter gave more positive results when direct plating was used. Thus when Stuart's medium is used a proctoscope is essential for the collection of rectal samples. Up to three sets of investigations were carried out where necessary, but 95% of the 145 cases were diagnosed on the results of the first set. However, only 54% of those patients diagnosed at their first visit had positive Gram-stain results. Further refinement of culture results is unlikely to improve diagnostic yield; what is needed is better, rapid diagnosis in the clinic.

Introduction

Women with uncomplicated gonorrhoea often have no symptoms or signs, and the diagnosis depends on the recognition of typical Gram-negative intracellular diplococci in stained smears and on the identification of *Neisseria gonorrhoeae* in cultures of secretions (King and Nicol, 1975). Other methods, such as serum antibody tests, still give too many false-positive and false-negative results to be of value in the diagnosis of individual cases (World Health Organisation, 1978). Even with modern laboratory methods the organism may be difficult to identify in infected secretions so that repeated examination may be necessary (Chipperfield and Catterall, 1976).

The object of this paper is to describe the findings at different sites in women with uncomplicated ano-genital gonorrhoea and the diagnosis rate at first and subsequent examinations.

Material and methods

The findings in 145 consecutive female patients diagnosed as having gonorrhoea during 1976 and 1977 were assessed retrospectively.

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CLINICAL INVESTIGATIONS

After routine history and genital examination the following investigations were undertaken. A bivalve speculum was inserted into the vagina and the ectocervix exposed. Vaginal secretion was wiped off with sterile cottonwool and material from the cervical os was collected with a sterile cottonwool bud; this was smeared on to a clean glass slide for Gram staining and a culture plate was inoculated (see below). A charcoal impregnated swab was inserted into the os and broken off in a bottle of Stuart's transport medium. The speculum was removed by running the upper blade along the anterior vaginal wall to massage secretions along the urethra to the meatus. A cotton bud was gently inserted into the meatus and a smear for Gram staining was made and a culture plate inoculated. The distal 2 cm of the urethra was then massaged through the anterior vaginal wall and a charcoal swab was inserted into the meatus and then placed in Stuart's transport medium. In the first 89 patients who presented as sexual contacts of men with gonorrhoea, a cotton bud was passed straight up the anal canal for approximately 5 cm until a relaxation was felt, suggesting the tip had reached the rectum, and was then withdrawn. A smear was made and a plate inoculated as before. A charcoal swab was then inserted in a similar manner and placed in Stuart's medium. These investigations will be called anal. Finally, a proctoscope was passed

and material for Gram stain, direct inoculation, and a Stuart's culture was taken. These investigations will be called rectal.

MICROBIOLOGICAL INVESTIGATIONS

Smears for Gram staining were prepared and read in the usual manner in the clinic.

Swabs were kept in Stuart's medium at room temperature for not more than 19 hours before plating on to the growth medium (Riddell and Buck, 1970). Plates inoculated in the clinic were immediately placed in a candle extinction jar, which was put into an incubator at 36°C in the clinic. After three to 18 hours the jar was transferred to the microbiology department where incubation was continued for a further 48 hours in a carbon dioxide incubator (Gallenkamp). Suspicious colonies were examined by the oxidase reaction and by sugar fermentation.

Yates's χ^2 test and the binomial test were used for statistical calculations.

Results

In all 145 cases samples from the urethra and cervix were examined, in 119 cases rectal samples were examined, and in 89 anal samples were examined. The overall findings obtained at each of the four sites are presented in Table 1. The highest positive yield was obtained from cervical samples and the lowest from anal samples. If only cervical samples for Gram stain and culture had been taken 85·5% of cases would have been diagnosed, whereas if only cervical culture specimens had been taken 79·3% of cases would have been diagnosed. If a single cervical culture specimen had been taken at the patient's first visit 74·4% of cases would have been diagnosed.

Table 1 shows that culture specimens gave more positive findings than Gram stains at all sites, the difference being most marked in anal samples. Comparison of results of plates inoculated in the clinic and those inoculated with Stuart's swabs showed no significant difference ($P>0·5$ in all combinations by the χ^2 test).

When cases giving positive results at only a single site (urethra, cervix, or rectum) are analysed (Table 2) the cervix gave the highest proportion, 18·6% of all cervical samples, the rectum the second highest (8·4%), and the urethra the third with 6·2% of positive results. Comparison of the urethral with rectal results shows no significant differences ($P>0·1$ in all combinations); it is apparent that urethral Gram stains gave a poor yield, with only one case showing positive results by Gram stain and culture and two cases positive results by Gram stain alone. Examination of the findings at the urethra and cervix in Table 2 (too few rectal results for analysis) by the binomial test showed that smears and cultures gave similar results. If at the urethra the two positive Gram-stain results, unsupported by cultural findings, are excluded on the assumption that they are false-positives—as their admitted contacts did not have gonorrhoea (negative results to Gram stain and culture)—then the cultural findings are superior to the Gram stain findings ($P=0·032$). In contrast, sexual contacts of seven of the nine patients with positive results to Gram-stain alone at the cervix did have culture-positive gonorrhoea.

Table 1 *Positive results at each site sampled*

	Urethra		*Cervix*		*Rectum*		*Anus*	
Method	*No.*	%	*No.*	%	*No.*	%	*No.*	%
Gram stain	24	16·5	80	55·2	18	15·1	2	2·2
Culture	82	56·5	115	79·3	62	52·1	15	16·8
Total examined	145		145		119		89	
Plate	28	56·0	37	74·0	21	42·0	8	23·5
Total plate cultures	50		50		50		34	

Table 2 *Cases with positive results at one site only*

	Urethra		*Cervix*		*Rectum*	
Method	*No.*	%	*No.*	%	*No.*	%
Positive results by						
Gram stain only	2	1·4	9	6·2	0	
Culture only	6	4·1	10	6·9	4	3·4
Gram stain and culture	1	0·7	8	5·5	6	5·0
Total	9/145	6·2	27/145	18·6	10/119	8·4

Table 3 *Comparison of rectal and anal investigations in women (89 cases)*

Rectal findings	*Anal findings*					
	*Gram stain**		*Culture†*		*Gram stain and culture‡*	
	Positive	*Negative*	*Positive*	*Negative*	*Positive*	*Negative*
Gram stain						
Positive	2	8				
Negative	0	79				
Culture						
Positive			12	13		
Negative			3	61		
Gram stain and culture						
Positive					12	17
Negative					3	57

*Binomial test, P=0·008
†Binomial test, P=0·022
‡Binomial test, P=0·002

There were few positive anal findings (Table 1). These are analysed in Table 3, which shows that rectal Gram-stain, rectal culture, and rectal Gram-stain or culture or both all gave significantly more positive results than the corresponding anal investigations. Had anal investigations been relied upon, only 15 positive results by Gram stain or culture or both would have been obtained compared with 29 positive rectal results. No case had positive results in anal investigations alone.

Finally, Table 4 shows that 95·2% of the patients were diagnosed as having gonorrhoea after one examination, 98·6% after two examinations, and the remaining 1·4% at the third examination. However, only 54·3% of those diagnosed at their first visit had positive Gram-stain results.

Table 4 *Cases diagnosed at first, second, and third examinations*

	Positive results by			
	Gram stain or culture or both		*Gram stain*	
Examination	*No.*	%	*No.*	%
First	138	95·2	75	54·3 (of 138)
Second	5	3·4	3	60·0 (of 5)
Third	2	1·4	2	100·0 (of 2)
Total	145	100·0		

Discussion

The results in Table 1 are in broad agreement with those of Barlow and Phillips (1978), although more of their cases had positive results at urethra and cervix. Comparison of results at one site only showed that Barlow and Phillips (1978) had fewer positive results by microscopy alone at the urethra (1 in 603) but more positive culture results, so the overall urethral results were similar. The same pattern was evident in their cervical results. Barlow and Phillips (1978) suggested that urethral Gram stains, but not culture, might be omitted and the findings here lend support to this suggestion. Furthermore, it seems reasonable to suppose that the two patients in whom the urethral Gram-stain alone gave positive results did not, in fact, have gonorrhoea.

Previous comparisons of use of transport media and direct plating in the clinic have been contradictory. Danielsson and Johanisson (1973) reported a 3% loss with Stuart's medium compared with direct plating, while Hosty *et al.* (1974) found a 44% loss with Stuart's medium. Our findings in Table 1 show no significant differences between the two methods and this will be reassuring to all those who have to use transport medium for geographical reasons (see, for example, Adler *et al.*, 1978).

Anal investigations gave a poor yield of positive results (15) compared with rectal investigations (29) (Table 3). This is why anal investigations were abandoned after the results from the first 89 patients had been analysed. These results agree closely with the findings of a similar study (Bhattacharyya and Jephcott, 1974), although it is not clear how far the swabs were inserted. In contrast, in a larger series (Deheragoda, 1977) similar results were obtained from anal swabs inserted the same distance as our own and rectal swabs passed through a proctoscope. Bhattacharyya and Jephcott (1974) used Stuart's transport medium while Deheragoda (1977) directly inoculated plates. In our small series of 34 cases in which direct plating was used, the yield of eight (23·5%) positive results was higher than in the larger series in which Stuart's transport medium was used (15 [16·7%] positive results in 89 cases) (Table 1).

While it is apparent that there is no difference between overall urethral and rectal results (Table 2) we believe that the finding of 8·4% of cases with

positive results in the rectum alone shows that examination of this site is important in the investigation of gonorrhoea in women, but when Stuart's transport medium is used, specimens must be collected through a proctoscope.

If a single cervical Stuart's culture had been taken at the first visit, 25·6% of cases would have been missed.

Our diagnosis rate for gonorrhoea, 95·2% at the first examination and 98·6% after two examinations (Table 4), is in broad agreement with other recent studies (Chipperfield and Catterall, 1976; Evans, 1976). Although Barlow *et al.* (1976) had a higher percentage of positive diagnoses (97%) at the first examination it seems unlikely that refinement of culture methods will produce great increases in diagnostic yield. What is more important is to consider methods for increasing accurate diagnosis in the clinic at the first visit, for this will continue to depend on identification of the gonococcus or gonococcal antigen (World Health Organisation, 1978). It is also apparent that accurate diagnosis of gonorrhoea will remain the concern of the specialist with appropriate microbiological support.

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