

# Value of vaginal and rectal cultures in the diagnosis of gonorrhoea

## *With special reference to areas with limited medical facilities*

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The control of venereal diseases in Greenland poses special problems because 40 per cent. of the inhabitants live outside the towns in a great number of scattered trading stations and settlements. Thus it is impossible to offer the service which would be appropriate in a more densely populated area. The current health service among these 40 per cent. is in the hands of midwives, the theoretical and practical training of whom is limited, and consequently only simple diagnostic procedures can be employed.

The midwives have been trained in collecting specimens from the urethra, both for the preparation of slides and for the despatch of samples in Stuart's transport medium in thermocontainers to the nearest Gonococcus Laboratory (Lomholt and Berg, 1966). This practice of the midwives has been of considerable value in the diagnosis of gonorrhoea in both men and women. However, as might be expected, a number of cases of gonorrhoea in women will have escaped detection because it was not possible for the midwives to take specimens from the cervix.

The present study was undertaken to investigate whether vaginal and rectal specimens could be used and to what extent they could replace cervical secretion specimens.

### **Methods and material**

The investigation was carried out in the Gonococcus Laboratory, Julianehaab, Greenland, from January, 1967, to September, 1969. The materials and techniques were identical with those used at the Neisseria Department, Statens Seruminstitut, Copenhagen (Reyn, 1965). A selective medium containing Polymyxin B sulphate (25 IU/ml.) and nystatin (25 IU/ml.) was used (see Discussion).

The study comprises 815 female patients infected with gonorrhoea. Three series of cases were investigated by means of specimens from different combinations of sites. (1) Specimens were collected, in connection with screening for gonorrhoea among young unmarried persons, from the urethra, vagina, and cervix (168 patients).

(2) Specimens from cases found by contact tracing at the VD Clinic in Julianehaab were obtained from the urethra, vagina, rectum, and cervix (265 patients).

The investigations in these two series were performed by the author.

(3) Specimens from cases also found by contact tracing at the VD Clinic were examined by laboratory-trained midwives, who were instructed to take the specimens from the urethra, rectum, and cervix (as far as possible) (382 patients).

All specimens were taken with wooden applicators impregnated with charcoal without any previous cleaning procedure. Samples from the rectum were obtained by rotating the applicator in order to reach the crypts. Cervical samples were taken through a tubular speculum.

All the specimens were plated directly onto the selective medium and incubated within 1 hour. Identification of *N. gonorrhoeae* was made by means of oxidase reaction, microscopy of Gram-stained smears, and fermentation tests.

In every case subcultures were finally examined for their sensitivity *in vitro* to penicillin, streptomycin, and tetracycline by a plate-dilution technique (Olsen and Lomholt, 1969).

### **Results (Tables I, II, and III)**

The percentages shown in these and the following Tables are all based on the supposition that 100 per cent. of the cases were detected when specimens were taken from all the sites studied in each series.

The value of vaginal and rectal cultures compared with the traditional combination of sites (urethra and cervix) is shown in Table IV (overleaf), in which the results from Tables I to III are summarized. The

TABLE I *Series 1. Distribution of positive cultures from patients found by screening (medical examinations)*

Site	All positive	2 positive			1 positive			Total positive		Overgrown
		Number	Per cent.							
Urethra	+	+	+	-	+	-	-	130	77.4	0
Cervix	+	+	-	+	-	+	-	155	92.2	0
Vagina	+	-	+	+	-	-	+	133	79.2	1
No. of patients	103	17	5	22	5	13	3	168		
Percentage	61.0	10.1	3.0	13.1	3.0	7.7	1.8	100		

TABLE II *Series 2. Distribution of positive cultures from patients found by contact tracing (medical examinations)*

Site	All positive	3 positive				2 positive				1 positive				Total positive		Overgrown	
		No.	Per cent.														
Urethra	+	+	+	+	-	+	+	-	+	-	-	+	-	-	229	86.4	0
Cervix	+	+	+	-	+	+	-	+	-	+	-	-	+	-	242	91.3	1
Vagina	+	+	-	+	+	-	+	+	-	-	+	-	+	-	226	85.3	1
Rectum	+	-	+	+	+	-	-	+	+	+	-	-	+	-	169	63.7	3
No. of patients	142	61	4	3	3	9	0	15	4	3	2	6	5	0	8	265	
Percentage	53.6	23.0	1.5	1.1	1.1	3.4	0	5.7	1.5	1.1	0.8	2.3	1.9	0	3.0	100	

TABLE III *Series 3. Distribution of positive cultures from patients found by contact tracing (examination performed by midwives)*

Site	All positive	2 positive			1 positive			Total positive		Overgrown
		Number	Per cent.							
Urethra	+	+	+	-	+	-	-	342	89.5	2
Cervix	+	+	-	+	-	+	-	323	84.6	1
Rectum	+	-	+	+	-	-	+	200	52.4	4
No. of patients	170	123	16	4	33	26	10	382		
Percentage	44.5	32.2	4.2	1.5	8.6	6.8	2.6	100		

percentages given in Table IV illustrate the diagnostic value of the combinations (in Table IV comparisons should be made horizontally).

In the first series, an additional 20.8 per cent. of cases were diagnosed when the urethral and cervical results were combined. The increase obtained by combining the urethral and vaginal results was 14.9 per cent.

In the second series, the gains were 9.8, 7.6, and 6.1 per cent. when the results from the urethra were combined with those from the cervix, vagina, and rectum, respectively. The findings shown in column 2 of the third series correspond largely to those in the same column of the second series. Column 3 of the second series shows that the diagnostic accuracy was increased more by the cervical and rectal than by the vaginal sampling.

## Discussion

A selective 'chocolate' agar medium was used for culturing in the present study. Since 1959, a selective inhibition of contaminants by adding Polymyxin B sulphate, nystatin, ristocetin, or similar substances has been employed by various authors (Crookes and Stuart, 1959; Cortieu, Bertoye, and Longaray, 1959; Reyn, Korner, and Bentzon, 1960; Berger, 1961, 1966; Thayer and Martin, 1964; Reyn, 1969).

This selective inhibition has proved to be of special value in the diagnosis of gonorrhoea by culture from the vagina and rectum. Wilkinson (1965) reported an increase in the yield of positive results from non-selective to selective (Thayer-Martin) medium of 5 per cent. in the urethral samples, 15 per cent. in the vaginal, and 67 per cent. in the rectal samples in a series of 54 female cases of gonorrhoea.

TABLE IV *Percentage increase in cases found positive when urethral examination is supplemented by examination of other sites*

Series	Examination		
	(1) Urethra alone	(2) Urethra + one other site	(3) Urethra + two other sites
(1) Urethra + Cervix + Vagina } = 100	77.4	Urethra + Cervix 98.2 Urethra + Vagina 92.3	
(2) Urethra + Cervix + Vagina + Rectum } = 100	86.4	Urethra + Cervix 96.2 Urethra + Vagina 94.0 Urethra + Rectum 92.5	Urethra + Cervix + Vagina 97.0 Urethra + Vagina + Rectum 98.1 Urethra + Cervix + Rectum 100.0
(3) Urethra + Cervix + Rectum } = 100	89.5	Urethra + Cervix 97.4 Urethra + Rectum 93.2	

Roepstorff and Hammarström (1966), who also made a double study on the Thayer-Martin medium, found the increased yield to be 23 per cent. in specimens from the urethra, cervix, and rectum. The percentage of positive rectal cultures increased from 11 to 32 per cent. after the introduction of the selective medium. In 63 cases of rectal gonorrhoea studied by Heimans (1966), gonococci were demonstrated on the selective medium in all cases and on the non-selective medium in 42 cases only. Reyn (1969) confirmed that the identification of *N. gonorrhoeae* was much facilitated on the selective medium (Thayer and Martin, 1964), but mentioned that the gain of positive cultures on that medium varied from one experimental series to the other, and that a few gonococcal strains were found to be very sensitive to ristocetin.

Because of the simplified technique used in collecting the specimens in the present work, the diagnostic value of this technique should be judged in relation to results obtained in similar studies with an approved technique. Table V shows the results from relevant papers. Specimens from the urethra and cervix are included in all the results reported, only some of which comprise both vaginal and rectal specimens. However, as seen in Tables I to III, there were only a few cases in which both the urethral and cervical specimens were negative. Consequently, a change in the percentages quoted because of investigation of either the vagina or the rectum should be of minor importance in the comparisons. Direct plating was

used in most of the papers referred to although, in the work of Wilkinson (1965) and Roepstorff and Hammarström (1966), the specimens were kept initially in a transport medium and inoculated on to plates after a maximum of 24 hours. Double plating of the samples was carried out by Wilkinson (1965), Roepstorff and Hammarström (1966) and Lucas, Price, Thayer, and Schroeter (1967) and, as emphasized in the last two papers, this probably contributed to the lower yield reported from the urethra in these series (66 per cent. in both).

The results in the papers referred to and in our three series from Greenland show some variations, but these seem to be within the same range. The third series clearly differs from the others, the cervix yielding fewer positive results than the urethra. The examinations in the third series were performed by the trained midwives and the difficulty in obtaining a sufficient amount of secretion from the cervix probably explains this disparity.

Schmale, Martin and Domescik (1969) reported some of the results from the culture site combinations. Most of them are very similar to the findings in the present investigation (*e.g.* cervix/rectum positive in 100 and 95.5 per cent. (Schmale and others, 1969) and 97.7 per cent. in the present work (Table II)). The agreement is less in other combinations (*e.g.* urethra/vagina positive in 84.8 and 86.2 per cent. compared to 94.0 per cent. (Table V, second series)). According to the information available, it is difficult to judge whether the dis-

TABLE V Summary of results given by culture on selective medium and by present investigation

Authors	Date	Per cent. positive				Number of patients
		Urethra	Cervix	Vagina	Rectum	
Heimans	1966	?	?	—	49	85
Lucas and others	1967	66	92	86	—	1170
Roepstorff and Hammarström	1966	66	76	—	59	98
Schmale and others	1969	78 (1) 71 (2)	84 89	78 82	49 57	112 94
Scott and Stone	1966	?	?	—	41	74
Wilkinson	1965	80	83	70	28	54
Series 1 Screening		77	92	79	—	168
Series 2 Contacts		86	91	85	64	265
Series 3 Tested by midwives		89	85	—	52	382

crepancy in some of the results reported is of any significance.

Roepstorff and Hammarström (1966) reported that the rectum was the only infected site in 7 per cent. of cases, and Scott and Stone (1966) reported 3 per cent. In the present investigation the corresponding findings were 3.0 per cent. in the second and 2.6 per cent. in the third series.

In an examination of 1,170 women (Lucas and others, 1967) with gonorrhoea, only 7 per cent. would have passed undetected if the cervix alone had been selected for the study. The corresponding figure for the present study would be 7.8 per cent. in the first series and 5.9 per cent. in the second, provided that the rectal specimens were omitted.

### Summary

The author has investigated a simplified method of examining women for gonorrhoea, appropriate for use by partly trained personnel in areas with limited medical facilities.

A quite satisfactory accuracy in diagnosis can be achieved without the use of a gynaecological couch or vaginal speculum and with a sterile wooden applicator as the only instrument; specimens are obtained from three sites (urethra, vagina, and rectum) and samples are inoculated onto a selective medium.

Compared with results from a full-scale examination (urethra, cervix, vagina, rectum), specimens from the urethra, vagina, and rectum yielded positive results in 98.1 per cent. of one group of cases, 96.2 per cent. being diagnosed by specimens from the urethra and cervix only. The highest yield of positive results was obtained by the combination of urethra, cervix, and rectum. Even though cervical

specimens are of significantly greater diagnostic value than vaginal specimens, the yield from urethral, cervical, and rectal specimens was only 2 per cent. more than that from samples from the urethra, vagina, and rectum, obtainable by an examination requiring little training or equipment.

The results obtained on selective medium in the present work were in fairly good agreement with those obtained by other investigators. Apparently the yield of positive results was not diminished by the simplicity of the technique employed.

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**Intérêt des cultures vaginales et rectales pour le diagnostic de la gonococcie, avec référence spéciale aux régions à possibilités médicales limitées**

**SOMMAIRE**

L'auteur a étudié une méthode simplifiée d'examen des femmes pour le diagnostic de la gonococcie pouvant être utilisée par un personnel de formation limitée dans les régions où les possibilités médicales sont réduites.

Le diagnostic peut être assuré d'une manière tout à fait satisfaisante avec l'aide d'un tampon de coton stérile comme seul instrument, sans que l'on ait besoin d'utiliser une table gynécologique ou un spéculum vaginal; les

échantillons sont recueillis à trois endroits (urètre, vagin et rectum) et ensemencés sur un milieu sélectif.

Par comparaison avec les résultats d'un examen plus complet (urètre, col, vagin, rectum) les prélèvements de l'urètre, du vagin et du rectum ont permis d'obtenir des résultats positifs dans 98,1 pour cent dans un groupe de cas; 96,2 pour cent ayant été diagnostiqués par les seuls prélèvements de l'urètre et du col. Le plus grand nombre de résultats positifs a été obtenu par les prélèvements conjugués de l'urètre, du col et du rectum. Bien que les prélèvements cervicaux soient d'une plus grande valeur significative que les prélèvements vaginaux, le résultat, à partir de l'urètre, du col et du rectum, fut seulement de 2 pour cent supérieur à celui obtenu à partir de l'urètre, du vagin et du rectum, lesquels ne demandent qu'un minimum d'entraînement et d'équipement.

Les résultats obtenus sur le milieu sélectif dans ce travail sont en très bon accord avec ceux d'autres auteurs. Apparemment, le nombre de résultats positifs n' a pas été diminué par la simplicité de la technique employée.