

Changing trends of gonococcal infection in homosexual men in Edinburgh

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SUMMARY

In an attempt to explain the recent resurgence of homosexually-acquired gonorrhoea in the Lothian region of Scotland the number of infections and pattern of infection (urethral, rectal and pharyngeal) of all gonococcal isolates from homosexual men attending the Department of Genitourinary Medicine at Edinburgh Royal Infirmary between 1985 and 1990 were analysed. Serovar typing data were available from infections acquired between January 1986 and December 1990. A correlation between one serovar, Bacejk/Brpyust, and the overall pattern of gonorrhoea was observed. The number of infections caused by minor serovars also correlated with rates of gonococcal infection. The number of minor serovars isolated, which may represent strains from other geographical locations, is related to the total incidence of gonorrhoea. It is possible that the incidence of Bacejk/Brpyust may be determined by the size of the infected pool of gonorrhoea. The most likely explanation for the recent increase in gonorrhoea is a change in sexual behaviour and/or an influx of strains from other geographical areas.

INTRODUCTION

Gonorrhoea was well recognized as a common sexually transmitted disease in homosexual men but following the health campaigns in the mid 1980s encouraging safer sexual practices with respect to the transmission of the human immunodeficiency virus (HIV) the incidence of gonococcal infection dropped sharply in this population [1]. More recently a number of centres have reported an increase in gonococcal infection [2–4].

In order to increase our understanding of the mechanisms underlying these recent trends we analysed the sites of gonococcal infection and variety of gonococcal serovars in homosexual men in an attempt to correlate individual serovars with the changing patterns of infection.

METHODS

All male patients admitting to homosexual contact who attended the Department of Genitourinary Medicine at Edinburgh Royal Infirmary, Edinburgh

Table 1. *Number of cases of gonorrhoea in homosexual men in Edinburgh 1985-90*

Year	Gonorrhoea (%)	Total attendances
1985	60 (9.9%)	606
1986	62 (12%)	504
1987	*20 (5.4%)	369
1988	38 (10%)	374
1989	14 (4%)	347
1990	†50 (13%)	378

* Significant decline in incidence 1986-7 ($P < 0.001$).

† Significant increase in incidence 1989-90 ($P < 0.001$).

with a diagnosis of gonococcal infection between January 1985 and December 1990 were included in the study. The age of each patient was noted.

The diagnosis of infection with *Neisseria gonorrhoeae* was made by culture of material from the urethra, rectum or pharynx on modified New York culture medium and identification of isolates by sugar utilization and immunological methods as described elsewhere [5]. Most patients giving a history of homosexual contact have cultures taken routinely from all three sites regardless of symptoms.

The number of individual serovars was calculated for each quarter of the years 1986-90. The geographical origin of each serovar isolated between 1986 and 1990 was also noted.

Statistical analyses were performed using Fishers exact probability test and Spearman's Rank Correlation test.

RESULTS

The number of episodes of gonococcal infection in homosexual men is seen to drop significantly in 1987 compared to 1986 (Table 1). There is a marked increase in the number of gonococcal infections in homosexual men in 1990 which have risen from 14 (4% of the clinic population) in 1989 to 50 (13%) in 1990 ($P < 0.001$). The sites of gonococcal infection are shown in Table 2. The occurrence of rectal gonorrhoea had been falling since 1985 reaching statistical significance in 1988 (28 cf. 8, $P < 0.01$). There was a marked increase in rectal gonorrhoea from 3 cases in 1989 to 26 cases in 1990 ($P = 0.04$). The number of cases of pharyngeal gonorrhoea varied over the 5-year period but with no consistent trends apparent.

Over the 5-year period 5 serovars were isolated on at least 3 occasions in 2 or more years; Ae/Av, Back/Bropyt, Bacejk/Brpyut, Bacejk/Brpyust, Baejk/Brpyut (Table 3). The dominant gonococcal serovar varies from year to year but the only direct association between any individual serovar and the total number of infections was for Bacejk/Brpyust (Table 3, Fig. 1: $r = 0.85$). There is also a correlation between the number of infections due to minor serovars (taken as those not isolated at least three times per year in two or more years) and the total number of infections ($r = 0.82$).

The geographical origin of the infections are shown in Table 4.

In 1990 six serovars which had not previously been isolated in this area were detected: Baghjk/Bpyvut, Bajk/Broput, Behjk/Byvut, Bbck/Bys, Baejk/Bvpyu and Bcejk/Bpyust. These accounted for 12 (28%) of the 50 infections seen in 1990.

Table 2. Sites of gonococcal infection in homosexual men in Edinburgh 1985–90

Year	U only	R only	T only	U Total	R Total	T Total	No. of infections
1985	20	17	1	26	28	16	60
1986	20	12	7	31	19	17	62
1987	10	4	0	16	7	2	20
1988	14	6	5	24	8	12	38
1989	5	2	0	11	3	7	14
1990	14	11	5	26	26	15	50

U, urethra; R, rectum; T, throat

Table 3. Quarterly distribution of gonococcal serovars 1986–90

	1986				1987				1988			
	9	4	11	6	4	0	2	2	1	1	1	0
Back/Bropyt	9	4	11	6	4	0	2	2	1	1	1	0
Bacejk/Brpyust	1	4	7	1	1	0	0	1	2	3	0	0
Ae/Av	0	0	0	3	0	3	0	0	3	0	0	0
Baejk/Brpyut	0	0	0	0	0	0	0	1	0	0	2	3
Bacejk/Brpyut	0	0	0	0	0	0	0	0	0	3	6	1
Minor serovars	4	4	6	2	1	1	2	2	6	2	3	1
Total	14	12	24	12	6	4	4	6	12	9	12	5

	1989				1990			
	0	4	2	2	1	0	0	0
Back/Bropyt	0	4	2	2	1	0	0	0
Bacejk/Brpyust	0	0	0	0	2	3	1	7
Ae/Av	0	0	0	0	0	0	0	0
Baejk/Brpyut	0	0	0	2	3	2	3	2
Bacejk/Brpyut	0	0	0	0	0	1	3	0
Minor serovars	1	1	1	1	5	3	2	12
Total	1	5	3	5	11	9	9	21

Table 4. Geographical origin of serovars

	Lothian (%)	Scotland (not Lothian) (%)	Outside Scotland (%)	Not known
Back/Bropyt	38 (76%)	2 (4%)	6 (12%)	4
Bacejk/Brpyust	19 (58%)	2 (6%)	5 (15%)	7
Ae/Av	7 (78%)	0	2 (22%)	0
Baejk/Brpyut	9 (50%)	3 (17%)	1 (6%)	5
Bacejk/Brpyut	13 (93%)	0	1 (7%)	0
Minor serovars	34 (57%)	4 (7%)	12 (20%)	10

The mean age of homosexual men with gonorrhoea was 26 (range 18–38) over the study period.

DISCUSSION

In the population studied there was a sharp increase in the number of cases of homosexually acquired gonorrhoea in 1990. The observed increase is probably not due to one or two promiscuous infected index cases in that there were 14 different serovars represented amongst the 50 homosexually acquired infections in 1990 but

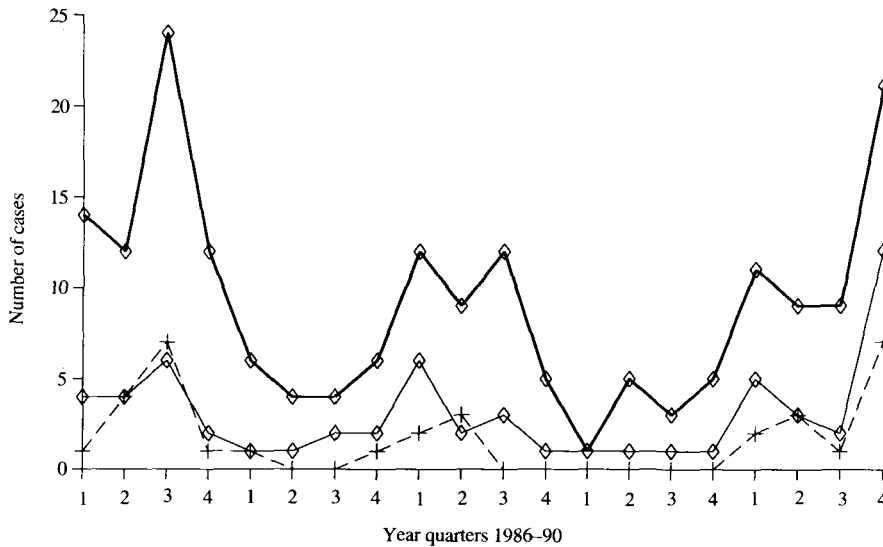


Fig. 1. Temporal changes in gonococcal serovars and total number of infections in Edinburgh 1986-90. +---+, Bacejk/Brpyust; ◇—◇, total cases; ◇—◇ minor serovars.

only a single infection was due to serovar Back/Bropyt. In previous years serovar Back/Bropyt has correlated strongly with homosexually acquired infection and from November 1985 to June 1986 accounted for 69% of homosexually acquired infection [6]. The drop in the number of cases in 1987 was presumably as a result of safer sexual practices following widespread health education messages encouraging 'safe sex' as a response to the threat of HIV infection. In particular this encouraged the use of condoms and discouraged promiscuity and could therefore be expected to reduce the incidence of gonorrhoea.

The mean age of homosexual men with gonorrhoea has not changed over the past decade [1].

The distribution of sites that were positive for gonococcal culture showed little relative change compared with the past decade [7] despite the overall increase in infections in 1990. In particular the increase cannot be attributed to more pharyngeal infections. This has important implications for HIV infection in this risk group. The number of cases of rectal gonorrhoea had been falling up to 1989 but increased markedly in 1990. 'Oral sex' is relatively low risk for the transmission of HIV but anal intercourse is high risk and the increase in gonococcal infection rate possibly parallels an increase in high risk behaviour amongst homosexuals.

It has been suggested that using gonorrhoea as a surrogate marker for unsafe sexual behaviour is inaccurate and that the history obtained from the patient is more reliable [8]. Although no single measurement can be used to assess changes in sexual behaviour the risk activity involved in contracting gonorrhoea is very similar to that for HIV.

Apart from changes in sexual behaviour another possible explanation for the recent increase in gonorrhoea is that there has been a change in the virulence or infectivity of the organism leading to more effective transmission and producing

an increase in the total number of infections. It is possible that the increased isolation rate of Bacejk/Brpyut and Bacejk/Brpyust in 1990 may reflect such changes. The natural history of isolation rates for individual serovars is to vary from year to year however [6] and the factors responsible for these variations are not known. A large influx of new strains may explain a localized rise in the incidence of gonorrhoea and the proportion of infections due to minor serovars did increase in 1990. It is therefore likely that the importation of new serovars contributed to the observed increase.

The incidence of only one serovar, Bacejk/Brpyust, correlates with the total number of infections. It is unlikely that this serovar should determine the overall total as it occurs relatively infrequently (33 times over 5 years). It is more likely that the overall incidence of gonorrhoea is a determinant for the incidence of Bacejk/Brpyust. A sufficiently large pool of sexually active individuals at risk of infection may be required before this serovar can become established in any one year.

There is also an association between the total number of infections and the number of less commonly isolated strains. These might represent new serovars being imported from different geographical locations giving support to the theory that the pattern of dominant serovars is determined by a continual influx of new strains from different areas some of which go on to become established. Although there is a trend towards more minor serovars originating outside Scotland this fails to reach statistical significance. It remains to be seen whether any of the serovars isolated for the first time in 1990 become dominant in future years.

In addition to changes in sexual behaviour and serovar pattern over the time period studied there has also been intense media attention directed at homosexual men with regard to HIV and AIDS. This may have resulted in the decline in attendance rates that has occurred (Table 1) and the recent increases may represent a 'rebound' effect of previously undiagnosed infection. It is unlikely however that the observed change in incidence in gonorrhoea is directly related to clinic attendance rates since the proportion of total attendances at the clinic with gonorrhoea has varied considerably and independently from the total number of attendances.

In conclusion the recent increase in the incidence of gonorrhoea in homosexual men is most likely a result of a change in sexual behaviour although other factors, in particular an influx of new gonococcal serovars from other geographical areas, may be contributing. A change in sexual behaviour producing an increase in the number of gonococcal infections may in itself produce a change in the serovar pattern.

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