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# Nonvalue of Neomycin Instillation after Intermittent Urinary Catheterization

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This study evaluated weekly urine cultures of patients with neurogenic bladder disease who underwent intermittent urinary catheterization for bladder retraining. One group of 53 patients in 1974 received regular instillations of 0.1% neomycin after each catheterization. A similar group of 55 patients in 1975 did not receive neomycin and constituted a control group. Distribution of age, sex, diagnosis, and duration of bladder retraining was comparable in both groups. Quantitative bacterial colony counts of $10^4$ to $10^5$ or greater per ml of urine were considered significant. There was no difference in the incidence of bacteriuria between the neomycin-treated group and the control group (53 versus 49%, respectively), and most patients in each group had colony counts $>10^5$/ml. *Escherichia coli* was seen less frequently in neomycin-treated patients (43.4 versus 62.5%), but a greater percentage of infections due to *Pseudomonas aeruginosa*, group D streptococci, and yeasts was noted in the neomycin-treated group than in the control group (41.5 versus 22.5%).

Since 1971, intermittent urinary catheterization has been practiced at our institution for the bladder (2, 4) retraining of patients with neurogenic bladder dysfunction. Catheterization is done every 4 to 6 h, until bladder retraining is accomplished, usually within a period of 6 to 8 weeks.

It is well known that urinary catheterization is a frequent cause of hospital-acquired infection. When bacteriuria occurs during bladder retraining, it is our practice to terminate this aspect of rehabilitation until the infection has been successfully eradicated. This complication prolongs rehabilitation and hospitalization. Unless contraindicated, all patients are given suppressive medication (methenamine mandelate or methenamine hippurate with ascorbic acid), with daily monitoring of urine pH and weekly monitoring of urine cultures. From 1971 to 1972, we noted that at least 50% of our patients developed bacteriuria during bladder retraining (unpublished data).

In 1973, we tried to reduce the incidence of bacteriuria by the routine instillation of 0.1% neomycin solution after each intermittent catheterization. This report relates our experience with neomycin in 1974 and compares it with that of a subsequent year (1975) in which neomycin was not given and when other variables did not appear to be significantly different in the patient population.

## MATERIALS AND METHODS

The criterion for inclusion in the study was the absence of bacteriuria at the beginning of intermittent urinary catheterization. When patients developed bacteriuria with $10^4$ colonies or greater per ml of urine, it was considered significant. When bacteriuria due to the same organism(s) was persistent, it was counted only once.

**Patient population.** Group A included 53 patients (33 males and 20 females) who in 1974 received instillation of neomycin after each intermittent catheterization for a mean of 6 weeks, a range of 1 to 19 weeks, and a median of 4 weeks.

Group B included 55 patients (33 males and 22 females) who in 1975 did not receive instillation of neomycin and were bladder retrained for a mean of 5.5 weeks, a range of 1 to 16 weeks, and a median of 4 weeks.

Underlying diseases of the patients in both study groups are shown in Table 1, with the most frequent problem being spinal cord trauma, followed by vascular diseases, multiple sclerosis, cancer, and miscellaneous disorders.

A urinary suppressive drug, either methenamine mandelate or methenamine hippurate with ascorbic acid, was administered to 92% of the neomycin-treated group and to 77% of the control group. The mean urine pH for patients from both groups was 5.7. Two-thirds of patients from both groups were receiving concomitant systemic antibiotics at some time during the study.

**Collection and processing of specimens.** Urine cultures for patients with intermittent catheterization were collected each Friday morning between 5:00 and

6:00 a.m. The specimen was obtained by collecting urine during catheterization in an aseptic manner, as recommended by Kunin (3). Specimens were promptly refrigerated and processed in the laboratory by 8:30 a.m. of the same day. Urine samples were cultured on 5% sheep blood agar and eosin-methylene blue agar according to standard techniques previously described (9). After 18 to 24 h of incubation, plates were examined, colonies were quantitated, and organisms were identified.

## RESULTS

The cumulative bacteriuric rates for study groups are shown in Fig. 1. Of 53 patients who received neomycin instillation, 53% developed bacteriuria during the observation period. A similar percentage of patients in the control group (49%) developed bacteriuria. No statistical difference was noted by the chi-square method of analysis. Symptoms such as fever, chills, and cloudy urine were seen in three of the neomycin-treated patients and in two of the control patients. The remainder of patients in both groups with positive urine cultures were asymptomatic.

TABLE 1. *Diagnoses of patients on intermittent catheterization*

| Diagnosis | No. of patients | |
|---|---|---|
| | Group A (neomycin) | Group B (control) |
| Spinal cord trauma | 32 | 25 |
| Cervical | 17 | 16 |
| Thoracolumbar | 15 | 9 |
| Vascular disease | 5 | 1 |
| Multiple sclerosis | 1 | 5 |
| Cancer | 2 | 2 |
| Other[a] | 13 | 22 |

[a] Includes congenital and inflammatory lesions of the spinal cord.

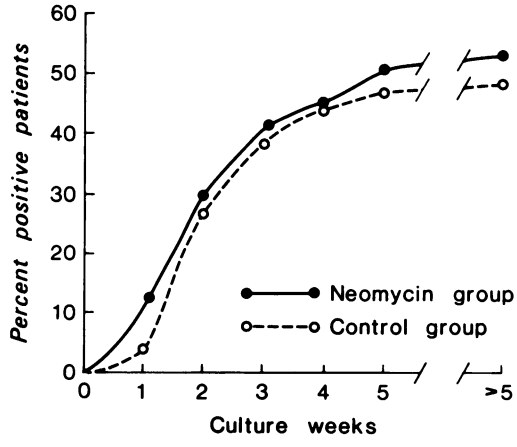


FIG. 1. *Cumulative bacteriuric rates for patients on intermittent catheterization.*

The presence of positive urine cultures with new or different organisms during the cumulative sampling period also was analyzed (Table 2). Urine cultures were positive in 17.8% of neomycin-treated cases sampled for 281 weeks and in 14.1% of control cases sampled for 284 weeks (no statistical difference).

Quantitation of colony counts was compared in the neomycin-treated and control groups (Table 3). More than two-thirds of patients in both groups had colony counts greater than $10^5$ per ml of urine, suggesting that neomycin had no effect in suppressing established bacteriuria.

The impact of the instillation of neomycin on the type of organism cultured during intermittent catheterization is shown in Table 4. Included in this distribution are three cases with cultures positive for two organisms (group A). The percentage of *Escherichia coli* isolates was less in the neomycin-treated group than in the control group (43.4 versus 62.5%), but there was a greater percentage of *Pseudomonas aeruginosa*, group D streptococci, and yeasts in the

TABLE 2. *Newly discovered bacteriuria during intermittent catheterization*

| Group | Culture-positive weeks | Total weeks sampled | % |
|---|---|---|---|
| A (neomycin) | 50 | 281 | 17.8 |
| B (control) | 40 | 284 | 14.1 |

TABLE 3. *Quantitation of new cases of bacteriuria during intermittent catheterization*

| Group | No. of cases $>10^5$ | Total cases ($>10^4$) | % |
|---|---|---|---|
| A (neomycin) | 37 | 50 | 74.0 |
| B (control) | 29 | 40 | 72.5 |

TABLE 4. *Distribution of organisms cultured during intermittent catheterization*

| Organism | Group A (neomycin) | | Group B (control) | |
|---|---|---|---|---|
| | No. | % | No. | % |
| *E. coli* | 23 | 43.4 | 25 | 62.5 |
| *P. aeruginosa* | 10 | 18.9 | 5 | 12.5 |
| Group D streptococcus | 10 | 18.9 | 4 | 10.0 |
| Other gram-negative bacteria | 5 | 9.4 | 5 | 12.5 |
| Other gram-positive cultures | 5[a] | 9.4 | 1 | 2.5 |
| Total | 53[b] | 100.0 | 40 | 100.0 |

[a] Includes two yeast isolates.

[b] Includes three cases of infection due to two organisms.

neomycin-treated group (41.6 versus 22.5%). Highly resistant organisms such as *Serratia marcescens* and indole-positive *Proteus* species were not seen in either group. In addition, there was no epidemiological evidence for a common source of spread of *P. aeruginosa* during the observation period.

## DISCUSSION

The rehabilitation climate in our unit is such that patients are encouraged and expected to participate in social activities, such as community dining and recreation. Automatic laundry facilities are shared by the patients in the unit. Acquisition of bacteriuria in such a setting is facilitated by inadequate personal hygiene or cross-transmission from staff and other patients rather than from fomites (8). Cross-transmission by leg drainage bags accounted for an outbreak of drug-resistant, gram-negative bacteria in our unit several years ago (10). To prevent these problems from recurring, rigid cleanliness must be observed by patients and nursing personnel, especially with disposal of contaminated urinary drainage devices (including leg bags) and condom catheters. Observation of "Secretion Precautions," as defined by the Center for Disease Control, Atlanta, Ga. (1), is encouraged by personnel handling any contaminated urine. If a patient has a urinary tract infection with a multiple-drug-resistant organism, such as gentamicin-resistant *P. aeruginosa,* "Wound and Skin Precautions" (1) should be considered until the organism has been eliminated.

In our experience, intermittent catheterization has decreased the incidence of febrile urinary tract infections during bladder retraining. Furthermore, it provides regular measurements of residual volume urine, information that is instructive both to patients and to the staff (5). However, even with meticulous aseptic technique, bacteriuria occurs in a certain percentage of patients (6), and, therefore, bacteriological surveillance, at least on a weekly basis, is recommended during intermittent catheterization.

Although the use of neomycin to reduce bladder contamination has been recommended in the literature (7), our results suggest that the use of neomycin is of doubtful value during intermittent urinary catheterization. Because this was a retrospective study, variables such as underlying disease, extent and duration of spinal cord injury, use of urinary suppressives, and use of systemic antibiotics, singly or in combination, may have influenced our results. Nevertheless, it is our opinion that such variables were equally operative during the consecutive years of the study. After reviewing these observations, we no longer practice routine instillation of neomycin after intermittent catheterization in our physical medicine and rehabilitation unit.

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