Urinary tract infections due to coagulase-negative staphylococci

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SYNOPSIS A survey of *Staphylococcus albus* urinary infections is reported from a general hospital. The infection followed urethral instrumentation in 75% of the patients, and was usually caused by organisms already present in the urethra. Novobiocin-resistant strains caused infections in four out-patients with no predisposing lesions or instrumentation of the urinary tract.

Although usually regarded as harmless commensals, coagulase-negative staphylococci (*Staphylococcus albus*) sometimes cause infections of the urinary tract. The most likely source of the organism would seem to be the patient's own urethra, of which it is a normal inhabitant (Shackman and Messent, 1954). The alternative possibility of infection by a common exogenous strain was suggested by the work of Pereira (1962), who described cases of urinary tract infection caused by strains of *Staph. albus* resistant to novobiocin, sensitive to other common antibacterial agents, and serologically homogenous.

These findings prompted us to investigate *Staph. albus* urinary infections recognized from January 1962 to March 1963 in a laboratory serving 600 beds in a general hospital.

METHODS

Infection by *Staph. albus* was diagnosed when the centrifuged deposit of a freshly-collected midstream or catheter specimen of urine (usually examined within two hours) contained excess leucocytes (more than 10 per high-power field), together with numerous clusters of Gram-positive cocci, and culture yielded a profuse growth of *Staph. albus* without other organisms. Antibiotic resistance patterns were determined by the agar plate diffusion method, using Mast discs, including a 5 µg. novobiocin disc. When on occasion a culture yielded mixed strains of *Staph. albus* the predominant strain only was investigated.

RESULTS

BACTERIOLOGY Sixty-three urinary infections due to *Staph. albus* were diagnosed in 60 patients. Strains were available for study from the most recent 36 of these.

The majority of strains isolated showed the typical colonial and microscopic appearances of staphylococci, were catalase-positive, and gave negative tests for tube-coagulase, alpha-toxin, mannite fermentation, pigmentation on milk agar medium, and phage typability. Three strains fermented mannite. One of these was pigmented, could be phage-typed, and was probably a coagulase-negative variant of *Staph. aureus*. Widely differing antibiotic resistance patterns were encountered. Of 58 strains tested, 13 were sensitive to all the commonly used antibacterial drugs; 14 were resistant to one drug only (penicillin eight, streptomycin one, tetracycline one, novobiocin four); and 31 were resistant to penicillin and at least one other drug. Seventeen strains were resistant to penicillin, streptomycin, and tetracycline.

The urine white cell count varied from 10 to 20 cells/high-power field (H.P.F.) in 19 cases, 20 to 50 cells/H.P.F. in 18, 50 to 100 cells/H.P.F. in six, 100 to 200 cells/H.P.F. in 12, and was over 200 cells/H.P.F. in eight.

CLINICAL DETAILS The main clinical categories are shown in Table I. In 75% of the patients, infection had followed instrumentation of the urinary tract, while in all but four of the other patients there were factors which predisposed them to infections.

Forty-three (70%) of the patients were males.

Urinary symptoms were usually slight and not always well documented, and in any case are difficult to assess after various forms of instrumentation. At least 10 patients, however, had moderately severe dysuria, with frank pyuria, and responded promptly to appropriate antibacterial therapy. In one patient visual proof of generalized cystitis was obtained at cystoscopy.

TABLE I

MAIN CLINICAL CATEGORIES IN PRESENT SERIES	
Clinical Categories	No. of Cases
<i>Previous instrumentation of urinary tract</i>	
Prostatectomy or resection of bladder tumour	21
Continuous urethral catheterization	13
Cystoscopy	5
Passage of sounds	2
Vaginal hysterectomy, catheterized	1
Post-partum, catheterized	3
Pyelolithotomy	1
<i>No previous instrumentation</i>	
Calculus of urinary tract	3
Bladder tumour	3
Urethral stricture	2
Chronic pyelonephritis	1
Diabetes mellitus	2
Pregnancy	1
Post-partum	1
No cause found	4

DISCUSSION

The majority of the patients were undergoing urological treatment or catheterization, with resulting trauma to the urethra which evidently was sufficient to enable commensal organisms to assume a pathogenic role. The causative strains possessed widely differing sensitivity patterns. In only a few instances could the sensitivity have been modified, or the organisms selected, by previous antibacterial therapy. Post-operative cross-infection by endemic 'hospital' strains of *Staph. albus* may sometimes have occurred, but there was no evidence of this. Thus, three urinary infections, which occurred simultaneously in patients in the same ward after prostatectomy, were caused by strains of *Staph. albus* with different sensitivity patterns. It was concluded that the infections were mostly caused by organisms already present in the urethra. This belief was supported by analysis of the previous incidence and causation of post-operative urinary infection in this hospital. During the period

1955 to 1959, measures were introduced to prevent cross infection, and the incidence of infection not due to *Staph. albus* fell from 74% to 11% (Gillespie, Linton, Miller, and Slade, 1960). In contrast, throughout this period, *Staph. albus* in pure culture continued to infect about 10% of all prostatectomy patients, though mixed infections of *Staph. albus* with other organisms, previously common, virtually disappeared.

Pereira (1962) isolated a novobiocin-resistant strain of *Staph. albus* from 40 patients, mainly females, in a Portuguese hospital practice, accounting for some 4% of all urinary infections; but he did not state whether other strains of *Staph. albus* caused infection. His strains may have been unusually invasive and capable of giving rise to cross-infection, but he gave no clinical or epidemiological details on which an opinion can be based.

In the present series there were four infections by novobiocin-resistant strains. All were in out-patients (three females and one male) and in none was a predisposing cause found for the infection. Symptoms were sufficiently severe to require antibacterial treatment in three of these patients. These limited findings are in line with Pereira's observations.

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REFERENCES

- Gillespie, W. A., Linton, K. B., Miller, A., and Slade, N. (1960). *J. Path.*, 13, 187.
 Pereira, A. T. (1962). *Ibid.*, 15, 252.
 Shackman, R., and Messent, D. (1954). *Brit. med. J.*, 2, 1009.

¹In a subsequent personal communication, Dr. Pereira states that all his described cases were of primary infections without predisposing lesions and without history of urethral instrumentation. Most of the patients were out patients from different districts of Lisbon.