Pseudomonas pickettii as a Cause of Pseudobacteremia

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An outbreak of pseudobacteremia caused by Pseudomonas pickettii biovariant 1 is reported. The common source was the aqueous chlorhexidine solution prepared by the hospital pharmacy. The contamination problem caused by the antiseptic solution was eventually solved by a series of preventive measures.

Pseudomonas pickettii biovariant 1 (formerly named Pseudomonas group CDC Va-1) is a nonfermentative gram-negative rod that is only infrequently found in clinical microbiology. In December 1982, this slow-growing nonfermenter was isolated from two patients in the same surgical ward. The strain was easily recognizable by its remarkable antibiotic susceptibility pattern and slow growth. Pinpoint colonies appeared after overnight incubation on blood agar at 37°C; after 48 h, they reached a diameter of about 1 mm. With the use of the identification methods of the Centers for Disease Control (8), the strain was recognized as P. pickettii biovariant 1.

The isolate was denied clinical significance and was considered a curiosity. No epidemiological investigation was undertaken. Between March and May 1983, P. pickettii was found in blood cultures from 15 more patients on 10 different wards. A common source of contamination or pseudobacteremia was suspected because no clinical signs of septicaemia could be demonstrated in several patients from whom these positive cultures were isolated. The antiseptic solutions were first suspected, and eventually the 0.05% chlorhexidine aqueous solution was proven to be the cause. P. pickettii was cultured from several receptacles of antiseptic solutions on different wards. These solutions were made by the hospital pharmacy from the concentrated product by dilution with distilled water. The large tank of distilled water and the smaller receptacles all contained P. pickettii.

Several measures were taken to prevent further contamination: the water tanks and containers were cleaned and steamed out or replaced, smaller (250-ml) vessels were used for the antiseptics on the wards, the expiration date (1 month) was noted on the receptacles, and the use of alcholonic antiseptic solutions for blood cultures and invasive procedures was reinforced.

Two months later, P. pickettii was again found in blood cultures. During a period of 2 days in December 1983, four new cases of P. pickettii infection were detected in three different wards. This new outbreak originated in the water used for the preparation of the chlorhexidine solutions.

The earlier control measures were reinforced; in addition, a bacteriological filter (0.22 μm Sartobran mini; Sartorius) was inserted between the tank where the solutions are diluted and the filling line. After each preparation, this filter was rinsed by reverse flushing with distilled water and autoclaved. Finally, each batch of the diluted antiseptic was bacteriologically controlled before delivery. Since then, no new cases of contamination were noted.

Antibiotic and antiseptic susceptibility testing. Antimicrobial susceptibility was studied by the disk-diffusion method (1). The organism was resistant to polymyxin, gentamicin, tobramycin, netilmicin, and amikacin and susceptible to ampicillin, cefazolin, tetracycline, and trimethoprim-sulfamethazine.

The strain was transferred several times on nutrient agar at room temperature and refrigerated at −70°C in 15% glycerol broth. Attempts 2 months later to subculture the strain for antiseptic resistance testing were unsuccessful. This was unexpected, given the resistance of this bacterium and its ability to survive in the oligotrophic environment.

In 1973, Ralston et al. (16) studied a group of hospital-isolated nonfermenters different from other known pseudomonads but phenotypically homogeneous. They proposed a new species, named Pseudomonas pickettii after M. J. Pickett, collector of the strains. Two recent studies (12, 15) based on cluster analysis, base composition, and biochemical characterization showed that most strains tentatively named Pseudomonas group Va-1 and Va-2, P. thomasii, and some of the unclassified group IVd belonged to this group. However, P. pickettii is certainly not a homogeneous species, and several biotypes can be distinguished.

P. pickettii like most nonfermentative bacteria, may be encountered in the hospital environment. The significance of its isolation in clinical specimens is difficult to assess in most cases. Occasionally, it is involved in disease production (6, 7, 9, 10, 14).

Phillips et al. (14) reported an outbreak of hospital infections caused by P. thomasii in 40 patients. The origin was the purified hospital water. P. pickettii biovariant 2 was found in cultures of water, urine, and cerebrospinal fluid samples and in cultures taken from throats and wounds (17). One study incriminated commercially prepared vials of 0.9% NaCl as the source of respiratory colonization with this bacterium (3). Fujita et al. (7) showed that the catheter insertion site was the point of entry of a septicemia in our intensive care patient.

A few reports also deal with P. pickettii biovariant 1. Strains were isolated from hospital water samples, from cultures of tracheal aspirate and pericardial fluid, from an infected eye and a knee wound, and from other samples (15).

Fass and Barnishan (6) described a nonfatal case of acute meningitis. Kahan et al. (10) published the results of an investigation of six cases of serious bacteremic infection in patients in a cardiac intensive care unit; the catheter insertion sites were contaminated with P. pickettii-containing chlorhexidine solution. Japp et al. (9) found the bacterium in blood cultures of a 44-year-old male compromised patient without signs of localized infection. A search for the source of the organism was unsuccessful, but the subclavian catheter was suspected.

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In the present series, the clinical significance of the isolates remains unclear. Simple contamination of the venipuncture site seems the most likely explanation. In some patients, infection caused by insertion of a catheter trough into contaminated skin could neither be proved nor excluded.

According to the literature, *P. pickettii* is always resistant to polymyxin and often to aminoglycosides and beta-lactam antibiotics. On the other hand, the bacterium is very susceptible to less potent antibiotics, such as chloramphenicol, tetracyclines, co-trimoxazole, and erythromycin. It is also resistant to some antiseptics and is able to survive in the oligotrophic environment. This is in sharp contrast with the difficulty of maintaining the isolates on agar without subcultures (15).

Aqueous solutions of chlorhexidine can be contaminated by pseudomonads. Several outbreaks of nosocomial infection, especially with *P. cepacia*, have been reported (2, 4, 5, 11, 18); *P. pickettii* seems to behave in the same manner. The clinical significance cannot be assessed without the clinical data for the individual patient.

Prompt investigation of the origin should be started in case of repeated isolations, as hygienic and epidemiological aspects are important. Alcoholic solutions must be used for skin antisepsis before venipuncture, catheter insertion, and other invasive procedures.

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**LITERATURE CITED**