Pseudomonas aeruginosa septicaemia from an oral source

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Oral colonisation with aerobic Gram-negative bacilli (AGNB) is abnormal and usually indicates a medically compromised state in the host. It has been postulated that oral colonisation with AGNB may predispose a patient to serious systemic infection, but proof of this assertion is lacking. This report describes an elderly patient who had oral colonisation of *Pseudomonas aeruginosa* and developed septicaemia from an identical strain of this bacterium.

An 84-year-old female, with chronic obstructive pulmonary disease, was admitted to hospital with an acute right lobar pneumonia. Sputum samples grew mixed respiratory flora but no AGNB. She was treated with 1 g daily intravenous ceftriaxone and responded well and, after 6 days she was discharged. Within 24 hours, she was readmitted with a high fever and signs of septicaemia. Blood and oral cultures grew pure growths of *Ps aeruginosa* (the patient did not wear dentures); three further sputum samples grew no *Ps aeruginosa.* She was again treated with 1 g daily intravenous ceftriaxone for 6 days and recovered. Her mouth swabs yielded heavy growths of *Ps aeruginosa* and she was selectively decontaminated with oral nystatin pastilles (100,000 units), polymyxie E (2 mg) and tobramycin (18.8 mg) four times daily for five days. This selective decontamination regime was obtained from the Pharmacy, Glasgow Royal Infirmary, Glasgow where it is routinely used. The patient has had no further episodes of septicaemia. On both admissions, sputum and urine samples were negative for AGNB.

Chromosomal DNA from a control *Ps aeruginosa* (NCTC 10662) and the oral and blood isolates were compared after endonuclease digestion, using pulsed-field gel electrophoresis (PFGE). DNA was digested with both Spe 1 and Xba 1 restriction endonuclease and the fragments separated by PFGE. The fragments were stained with ethidium bromide and compared. The two strains were found to be indistinguishable (Fig. 1).

This patient had her oral cavity sampled as part of a study (for which she had given informed consent) looking at the incidence of oral AGNB in elderly patients admitted to hospital with acute illness.[1] The fact that she developed a *Ps aeruginosa* septicaemia with concomitant oral carriage of the same microorganism allowed the two cultures to be compared. Indistinguishable strains of *Ps aeruginosa* were isolated from her oral cavity and blood. It is therefore likely that the mouth flora was the source of her septicaemia. No report was found in the literature describing the use of DNA restriction fragment length polymorphisms to compare oral and systemic strains of *Ps aeruginosa.* This report has additionally shown that the mouth may be a source of systemic infection.

Comment

The patient's septicaemia was managed using cephalosporins and she made an uneventful recovery. Her mouth was abnormally colonised by *Ps aeruginosa*[2] as this bacteria was consistently found on every occasion when the mouth was sampled prior to decontamination (results not shown). It is therefore probable that the mouth was the source of this patient's systemic infection because elderly debilitated people are known to be colonised with AGNB.[3,4] No significant pathology was present in her mouth, but this is often not necessary for spontaneous

In brief

- The mouths of elderly medically compromised patients can become abnormally colonised by aerobic Gram-negative bacilli
- In rare cases this can lead to septicaemia
- The colonisation can be prevented or eliminated by selective oral use of non-absorbable antibiotics (selective decontamination)

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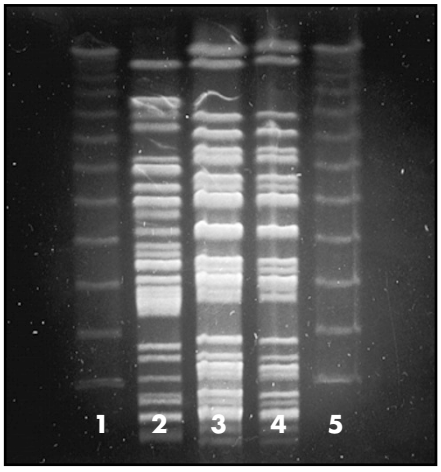

Fig. 1 This figure shows the DNA from the two *Ps aeruginosa* strains from the mouth and the blood. The DNA has been split into DNA fragments following digestion with the restriction endonucleases (A) SPE 1 and (B) Xba 1. The DNA fragments have been separated by pulsed field gel electrophoresis and can be compared. For control purposes two DNA standards have been included together with DNA from a type strain of *Ps aeruginosa.* Lanes 1 and 5 contain DNA standards; lane 2 *Ps aeruginosa* (NCTC 10662); lane 3 *Ps aeruginosa* (blood isolate) and lane 4 *Ps aeruginosa* (mouth isolate)

bacterial entry into the blood stream.[5] Elderly patients do acquire oral Gram-negative bacteria sometimes from nosocomial sources.[3,4] It is possible that the *Ps aeruginosa* came from the lungs as this patient had chronic obstructive pulmonary disease, but this is unlikely as three sputum samples did not yield any Gram-negative bacilli. To prevent systemic re-infection it was decided to selectively decontaminate her mouth of AGNB using non-absorbable antibiotics; this was successful.[6] The non-absorbable antibiotics chosen were tobramycin, polymyxin (colistin) and amphotericin. Tobramycin and polymyxin stop the colonisation of the mouth by Gram-negative bacilli and when used together no resistant strains will be selected to either antibiotic.[6] Amphotericin was also used as this is not absorbed, and this prevents opportunistic overgrowth of yeasts.

Oral carriage of AGNB is abnormal and this case shows that this could lead to serious infection. Selective decontamination should be considered in compromised patients with oral carriage of AGNB to prevent serious systemic infection.

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