

Bacterial endocarditis due to an actinobacillus

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SYNOPSIS A case of subacute bacterial endocarditis due to *Actinobacillus actinomycetemcomitans* followed dental extraction under penicillin cover. Isolation of the organism was only achieved by incubating blood cultures in a CO₂-enriched atmosphere. The patient was successfully treated with streptomycin.

Bacterial endocarditis due to *Actinobacillus actinomycetemcomitans* has rarely been recognized. Vallée and Gaillard (1953) recorded two cases. King and Tatum (1962) studied 27 strains isolated from human blood cultures in several laboratories, but did not state how many caused endocarditis.

CASE REPORT

A man born in 1912 had rheumatic fever in 1922. In 1951 he had bacterial endocarditis due to a viridans streptococcus, successfully treated with penicillin. Subsequently he was given benzyl penicillin injections whenever he had dental treatment; the last occasion was for the extraction of teeth in January 1962. In June 1962 he was admitted to another hospital where subacute bacterial endocarditis was diagnosed clinically, but repeated blood cultures were negative. His condition deteriorated despite penicillin treatment, and blood cultures in October were again negative.

In November 1962 he was transferred to the Bristol Royal Infirmary with pyrexia, aortic incompetence, splenomegaly, finger clubbing, Janeway nodes, microscopic haematuria, hypochromic anaemia, and raised E.S.R. Serological tests for syphilis, brucellosis, and Q fever were negative. Dental radiographs showed a peri-apical abscess. Aerobic and anaerobic blood cultures (Barritt and Gillespie, 1960) taken on four successive days were negative after two weeks' incubation. A subsequent blood sample was distributed in four blood culture bottles, two of which were incubated in air and two in a CO₂-enriched atmosphere in a candle-jar. After six days' incubation at 37°C., both CO₂ cultures showed numerous granular masses of Gram-negative coccobacilli on the surface of the sedimented blood. The supernatant broth remained clear. One of the two bottles incubated in air remained clear; the other showed a few small granules which might easily have been overlooked. Two further blood cultures incubated with CO₂ yielded the same organism.

The patient was treated with streptomycin, 2 g. daily,

for seven weeks. Benzyl penicillin, 5 mega units six hourly, with probenecid, was also given for the first three weeks. His condition promptly improved; deafness and vertigo due to the streptomycin subsequently disappeared, and he was well five months later.

BACTERIOLOGY The organism was a small non-encapsulated Gram-negative cocco-bacillus, similar in appearance to brucella but with occasional elongated forms and aggregated in dense masses. After 48 hours' growth on horse blood digest agar in a candle jar at 37°C. the colonies were up to 0.5 mm. in diameter, dome-shaped, pale grey, semi-translucent with matt surfaces and entire edges, and would not emulsify in saline. There was slight green discoloration under areas of confluent growth. After four days, the agar was pitted and later the growth became somewhat adherent to the medium. No growth occurred at 22°C.

On nutrient agar and MacConkey agar in a candle jar, colonies were only slightly smaller than on blood agar. Without added CO₂, growth was poor and uncertain on solid media. After subculture on blood agar, however, the organism grew well in broth as a granular deposit without additional CO₂. It was not motile. It failed to grow in peptone water or glucose phosphate broth. Growth on nutrient agar was not enhanced by X and V factors. It was catalase positive, oxidase negative, urease negative, indole negative (in nutrient broth), gelatin negative (Clarke, 1953), H₂S negative (0.01% cysteine broth with lead acetate paper); it reduced nitrate (Cook, 1950).

Carbohydrate fermentations, tested on phenol red nutrient agar plates containing 4% proteose peptone, gave the following results: acid from glucose, laevulose, maltose, mannitol and inulin but not from galactose, lactose, sucrose, salicin, and dextrin.

The organism was sensitive, by disc test, to streptomycin, chloramphenicol, tetracycline, neomycin, polymyxin B, colistin, and novobiocin; resistant to penicillin, methicillin, ampicillin, erythromycin, bacitracin, and vancomycin. Minimum inhibiting concentrations (agar plate dilution technique) were: penicillin, 50 units per ml. and streptomycin, 2.5 µg. per ml.

Inoculation in guinea-pigs and mice produced no lesions.

The organism conforms to the description of an actinobacillus, probably *A. actinomycetemcomitans* (King and Tatum, 1962). Its greater dependence on CO₂, smaller colonies, adherence to and pitting of agar, positive catalase, fermentation of mannitol but not lactose or sucrose, distinguished it from *Haemophilus aphrophilus* with which this organism has sometimes been confused in the past.

DISCUSSION

The diagnosis of bacterial endocarditis depended on CO₂-enrichment of blood cultures. Without this, the case might have been accepted as one of 'bacteriologically-negative' bacterial endocarditis, a condition which is rarer than is usually believed (Barritt and Gillespie, 1960).

Blood cultures should be incubated with added CO₂ when bacterial endocarditis is suspected and ordinary cultures are negative.

This case also illustrates the risk of endocarditis by a penicillin-resistant organism following extraction of teeth after prolonged or repeated penicillin treatment (Garrod and Waterworth, 1962). *A. actinomycetemcomitans* is sometimes present in normal mouths (Heinrich and Pulverer, 1959), but according to King and Tatum, not all strains are penicillin resistant.

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