CASE REPORT

ACUTE SYNOVITIS CAUSED BY AN ORGANISM OF THE *RHODOCHROUS* TAXON

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SUMMARY. A 36-year-old man with systemic lupus erythematosus developed synovitis of the right wrist caused by an organism of the *Rhodochrous* taxon. The capacity of this pathogen to produce a granulomatous inflammatory reaction in human tissues is discussed. The isolate was sensitive to chloramphenicol, gentamicin, carbenicillin and colistin in in-vitro tests and the infection responded promptly to treatment with chloramphenicol.

INTRODUCTION

Infection with organisms of the *Rhodochrous* taxon has been reported infrequently (Simon, 1962; Altire-Werber, O'Hare and Louria, 1968; Porres, 1973; Haburchak *et al.*, 1978; Boughton and Atkin, 1980). Originally thought to be *Mycobacterium* species, they are now thought to belong to a genus intermediate between *Mycobacterium* and *Nocardia* (Gordon, 1966; Tsukamura, 1971). Both healthy (Porres, 1973) and debilitated persons have been reported to suffer infection with this group of organisms (Simon, 1962; Altire-Werber *et al.*, 1968; Haburchak *et al.*, 1978). *Rhodochrous* has been recovered from pustular skin lesions (Porres, 1973), sputum of patients with chronic lung disease (Altire-Werber *et al.*, 1968; Haburchak *et al.*, 1978), the spinal fluid of a child with meningoencephalitis (Simon, 1962), the ventriculo-peritoneal shunt of a 5-month-old child (Boughton and Atkin, 1980), and the bone-marrow biopsy of a patient with Hodgkin's disease (Haburchak *et al.*, 1978). We now report on a patient with acute synovitis caused by an organism of this taxon.

MATERIALS AND METHODS

The organism was originally isolated from a clinical specimen examined in the Jewish Hospital microbiology laboratory; it produced red-orange colonies on Sabouraud's dextrose agar. Tests performed to identify the isolate included: Gram's stain; acid-fastness to hydrochloric acid in Kinyoun's technique (Runyon *et al.*, 1980), and to 1% sulphuric acid in a modification of the Ziehl-Neelsen method; two-week arylsulphatase test; ability to use sucrose as sole carbon source; 24-h nitrate reduction; urease production; catalase production; production of acid from glucose, mannose, sorbitol and mannitol. Ability to degrade ethylene glycol was tested in Middlebrook 7H-10 agar medium containing ethylene glycol 1% (Stottmeier and Molloy, 1973). Identification of the organism was confirmed by the Kentucky State Department of Health.

In-vitro antibiotic susceptibility testing was performed by plating a homogenised broth suspension of the isolate on to Mueller-Hinton and Sabouraud's dextrose agar plates and adding

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standard antibiotic-saturated disks. Standard zones of inhibition were measured and results recorded as sensitive or resistant.

RESULTS

Case report

A 36-year-old man with systemic lupus erythematosus (SLE) was admitted to hospital complaining of right wrist pain and limitation of motion, of 2 weeks' duration. One week before admission, phenoxymethylpenicillin had been prescribed without effect. The last exacerbation of his SLE was 18 months previously; he had required no protracted medication for its treatment. There was no history of travel; he had no venereal disease. His pet dog had been ill one month earlier, but recovered without veterinary care. There was no history of trauma, recent or remote; nor were any other joints affected.

His temperature was 98.4°F, pulse 80/min, respirations 16/min, and blood pressure 110/80 mm Hg. There was a diffuse, erythematous non-pruritic eruption over the face, arms and thorax. Dry crackles were present at the bases of both lungs; heart and abdomen were normal. The right wrist was tender and swollen but non-erythematous; there was limitation of active and passive movement, and moderate synovial hypertrophy.

The haematocrit was 41.3% and white blood cell count 21 000/mm³ with 80% neutrophils and 6% band cells. Serum chemistry was normal; erythrocyte sedimentation rate was 112 mm/h; antistreptolysin, streptozyme, brucella and leptospira antibody titres were not elevated. Arthrocentesis of the right wrist produced 1–2 ml of a greenish, turbid, viscous fluid, cultures of which were sterile, as were blood and urine. Examination of tissue obtained by biopsy showed gross synovial hypertrophy with multiple "rice bodies"; the histological appearance was of acute synovitis with multiple non-caseating granulomas. Culture of the synovial biopsy material yielded multiple red-orange colonies of an organism identified as a member of the *Rhodochrous* taxon.

Microbiology

Slide cultures on Sabouraud's dextrose agar showed no well-defined mycelia or aerial filaments. The organism was a pleomorphic gram-positive rod which resisted decolorisation with 1% sulphuric acid but was decolorised by hydrochloric acid in Kinyoun's technique. The organism degraded ethylene glycol, was arylsulphatase negative, and urease and catalase positive; it utilised sucrose as a sole carbon source, produced acid from glucose, mannose, mannitol and sorbitol, and reduced nitrate weakly.

In-vitro antimicrobial sensitivity tests indicated that the organism was sensitive to gentamicin, carbenicillin, chloramphenicol and colistin, but resistant to tetracycline, cephalothin, trimethoprim-sulphamethoxazole (cotrimoxazole) and tobramycin. The patient was treated with chloramphenicol, which resulted in prompt resolution of the infection. He remained symptom-free 12 months after discharge from hospital.

DISCUSSION

Organisms of the "*Rhodochrous* taxon" are biochemically and morphologically heterogeneous; they exhibit characteristics of both *Mycobacterium* and *Nocardia* genera (Gordon, 1966). Originally named *Mycobacterium rhodochrous* by Zopf (1891), they are usually considered to be non-virulent saprophytes (Tsukamura, 1971; Porres, 1973). The importance of and difficulties in distinguishing *Rhodochrous* from other "acid-fast" organisms has been extensively discussed (Gordon, 1966; Tsukamura, 1971, 1974a and b; Goodfellow, Fleming and Sackin, 1972; Haburchak *et al.*, 1978; Gordon, 1980). However, a number of reports have demonstrated that significant infection may occur in debilitated persons (Simon, 1962; Haburchak *et al.*, 1978). Porres (1973) isolated *Rhodochrous* from the skin lesions of an apparently healthy 17-year-old girl one week after she developed a papulovesicular rash on her thighs and left hand. Histological examination of tissue obtained by biopsy demonstrated

"dense round cell infiltration" without mention of granuloma formation, and the lesions resolved with topical therapy. Altire-Werber *et al.* (1968) reported two cases of apparent rhodochrous sepsis with positive blood cultures; one was in a patient with miliary tuberculosis and one in a patient with acute myocardial infarction and pneumonia. Two cases of meningitis caused by *Rhodochrous* have been reported in which organisms were isolated in pure culture from spinal fluid (Simon, 1962; Boughton and Atkin, 1980). In a child with congenital hydrocephalus, infection was temporally related to placement of a ventriculo-peritoneal shunt (Boughton and Atkin, 1980).

Haburchak *et al.* (1978) reported on three patients with rhodochrous infection. From one patient with leukaemia, and one with severe chronic obstructive lung disease requiring steroid therapy, organisms were isolated by transtracheal aspiration. From the third, with Stage IV Hodgkin's disease, *Rhodochrous* was isolated by a bone marrow biopsy, which revealed non-caseating granulomas histologically; these may have been a manifestation of Hodgkin's disease, or they may have represented rhodochrous infection. The authors further demonstrated that rhodochrous infection could be produced in guinea pigs, but only after treatment with high doses of methylprednisolone. Necropsy of the animals revealed granulomas in the organs affected; and *Rhodochrous* was recovered from the tissues. Previous animal studies had failed to produce infection in non-steroid-treated animals (Altire-Werber *et al.*, 1968; Tsukamura, 1971).

The demonstration of non-caseating granulomas in our patient by synovial biopsy, supports the earlier clinical and experimental evidence that *Rhodochrous* infection may result in granuloma formation. Our patient had acute synovitis caused by an organism of the *Rhodochrous* taxon; and we have failed to find any previous reports of pyoarthrosis or synovitis caused by this organism, although the Special Pathogens Branch, Center for Disease Control, Atlanta, Georgia, has documented approximately 130 isolates of this taxon, four of which were from "joint fluid" (Dr W. Schleck, personal communication).

Rhodochrous should be added to the list of normally saprophytic organisms capable of producing illness in immunocompromised hosts. The data presented here suggest that granuloma formation may be one manifestation of this infection, a finding supported by evidence in experimental animals (Haburchak *et al.*, 1978). Further studies into the pathogenesis and clinical manifestations of rhodochrous infection are warranted. For the present, antimicrobial therapy based on in-vitro sensitivity testing, combined with surgical debridement or excision, seems the most judicious course for physicians faced with infection caused by this organism.

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