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Erysipelothrix rhusiopathiae Endocarditis A Case Report

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Erysipelothrix rhusiopathiae endocarditis in man is a very rare disease. The bacteria can be easily misidentified as nonpathogenic gram-positive bacilli or streptococci. This organism was isolated from blood samples taken from a 39-year-old male farmer with subacute bacterial endocarditis. The patient had cirrhosis of the liver, diabetes, and tuberculosis. The isolate showed typical cultural and biochemical characteristics such as facultative growth, formation of small greenish colonies on blood agar, positive hydrogen sulfide, negative catalase, and nonmotility. The isolate was susceptible to penicillin G and the cephalosporins.

Key Words: *Erysipelothrix rhusiopathiae*, endocarditis.

Erysipelothrix rhusiopathiae is a facultatively anaerobic, gram-positive, rod-shaped bacterium (Seeliger 1974; Weaver 1985). The organism is primarily a pathogen of swine and other animals, but it can also cause human infection, the most common beeing erysipeloid (Klauder 1938; Woodbine 1950). Septicemia caused by it with or without endocarditis, is considered to be a very rare human infection. Endocarditis caused by this organisms has occured in persons without any previous valvular damage (Ehrlich 1946).

E. rhusiopathiae was isolalted from blood samples taken from a patient with tentative clinical diagnosis of infective endocarditis. The clinical features of the patient's condition, and the characteristics of the isolate are presented.

CASE REPORT

A 39-year-old male farmer (unit no. A1044015) was transferred from another hospital to Yonsei Medical Center on October 2, 1984, with a suspected diagnosis of subacute bacterial endocarditis. According to his past history he had been treated for cirrhosis of the liver in September of 1983. In July of 1984, he had been hospitalized at the other hospital for the treatment of diabetes mellitus and been found to have a high faver and leukopenia. He was treated with chloramphenicol. Since he was found to have edema of both legs, pulmonary edema, and hepatosplenomegaly, he was treated with digoxin and diuretics, with some improvement. However, intermittent fever of around 38°C persisted, and bacterial endocarditis was suspected.

On transfer to this medical center, the patient appeared to be chronically ill. His temperature was 38.3°C, and blood pressure 105/50 mm Hg. His heart beat was regular, but a systolic murmur of grade III/IV was heared. No heaving or thrill was noted. Fluid wave and shifting dulness were present. His liver and spleen were palpable and tender.

Chest X-ray findings were progressive cardiomegaly with bilateral pleural effusion and fibronodular densities of both upper lung fields from tuberculous infiltration. An EKG finding was that of a nonspecific repolarization abnormality. Echocardiogram showed minimal pericardial effusion, dilated left atrium and left ventricle, fluttering of the anterior mitral leaflet during the diastolic phase. This picture was compatible with a diagnosis of subacute bacterial endocarditis.

Blood chemistry showed low levels of calcium (7.8 mg/dl), cholesterol (68 mg/dl), total protein (6.3 g/dl), and albumin (2.4 g/dl), and high values for glucose (258 mg/dl), uric acid (8.2 mg/dl), total bilirubin (2.2 mg/dl), alkaline phosphatase (307 IU/L), lactic dehydrogenase (224 IU/L), and gamma-glutamyl transpeptidase (132 IU/L). Blood urea nitrogen was 21 mg/dl and creatinine 0.5 mg/dl. Serum iron was 162 μg/dl, and unsaturated iron-binding capacity was decreased to 19 μg/dl. Hematologic studies were

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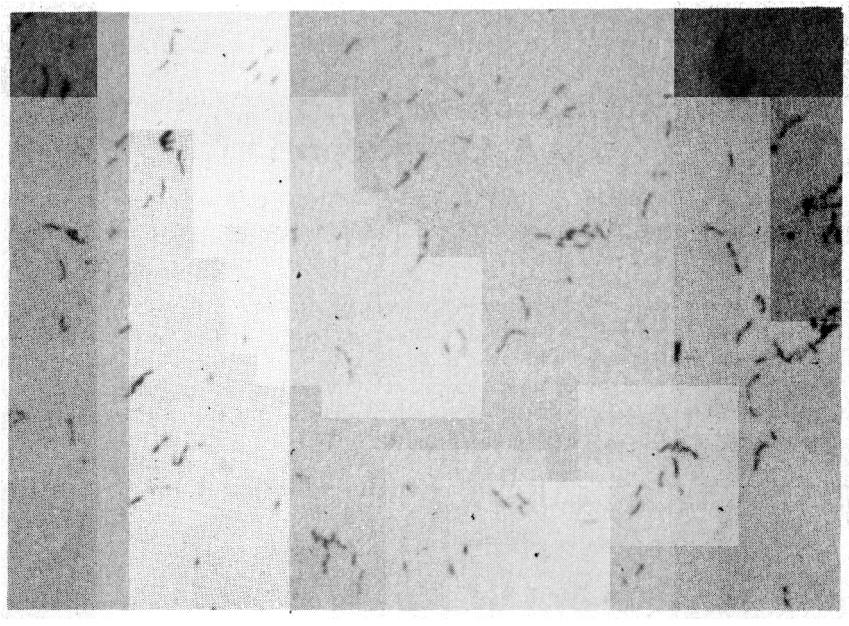

Fig. 1. Gram-stained smear of E. rhusiopathiae isolate.

Fig. 2. Colonies of the E. rhusiopathiae isolate on a blood agar plate (72-hour incubation).

hematocrit 21% and WBC count 9,000 /μl with 82% neutrophils, 17% lymphocytes and 1% monocytes. Platelet count was decreased. C-reactive protein, rheumatoid factor, and antiplatelet antibody were positive.

Blood cultures were done according to our routine procedure, i.e., 10 ml of venous blood was drawn and inoculated into each 50 ml of Tryptic soy broth (TSB, Difco) and Brewer thioglycollate medium (BTM, Difco). These medium were prepared from dehydrated

products. TSB were supplemented with 0.025% sodium polyanetholsulfonate. The bottles were incubated at 35°C, and daily observations were made. Stained preparation and subcultures were done when indicated.

Identification of the isolate was done according to the conventional method (Weaver 1985). The morphology of the colonies was determined by culturing them on a Tryptose blood agar (Difco) plate. Hydrogen sulfide (H_2S) production was tested, using triple sugar iron (TSI) agar. Acid production was tested using Cystine tryptic agar (Difco) with 1% carbohydrates and observed for up to 1 week. Antimicrobial susceptibility was tested by the standardized disk diffusion method (NCCLS, 1984).

Table 1. Characteristics of *E. rhusiopathiae* Isolate

Characteristic	*E. rhusiopathiae*[a]	Isolate 84-10-5058
Gaseous requirement	Facultative	Facultative
Blood agar, hemolysis	Alpha	Alpha
colony diameter (mm)	0.1-0.5	0.2-0.3
Growth at room temperature		+
35C	+	+++
42C		+
Catalase	−	−
Oxidase	−	−
H_2S (TSI)	+	+
Motility	−	−
Indole	−	−
Nitrate reduction	−	−
Simmons citrate	−	−
Gelatin liquefaction	−	−
Urease	−	−
Esculin hydrolysis	−	−
Acid from fructose	+	+
galactose	+	+
glucose	+	+
lactose	+	+
mannose	+	+
glycerol	−	−
inulin	−	−
maltose	−	−
mannitol	−	−
melezitose	−	−
raffinose	−	−
salicin	−	−
sucrose	−	−
trehalose	−	−
xylose	v	−

[a]Seeliger (1974) and Weaver (1985).

All of the three TSB and three BTM bottles which were inoculated with three blood samples showed moderate turbidity after 2 days of incubation. A gram-stained smear of the culture showed thin, slightly curved, gram-positive bacilli in single and chain arrangements (Fig. 1). A subculture on a blood agar plate showed smooth, round, convex colonies of 0.2-0.3 mm in diameter after a 24-hour incubation period in CO_2 (Fig. 2). The medium changed to slightly green in color. Catalase was negative and H_2S was positive in TSI agar. The isolate grew more rapidly at 35°C than at room temperature. Heavier growth was observed in the anaerobic portion of a semisolid BTM tube. Other characteristics are shown in Table 1. The isolate was identified as *E. rhusiopathiae*. The Centers for Disease Control, Atlanta, Ga. tested the cellular fatty acid profile and other characteristics and confirmed the identification. The isolate was susceptible to ampicillin, penicillin G, carbenicillin, piperacillin, cephalothin, cefamandole, cefoperazone, cefotaxime, chloramphenicol, and clindamycin. It was resistant to tetracyline, amikacin, gentamicin, kanamycin and tobramycin.

The patient was treated with 10 million units of penicillin G, 2 g of chloramphenicol, and 160 mg of gentamicin per day, in addition to being treated for tuberculosis, diabetes and his heart condition. His temperature became normal on the second hospital day, but his general condition did not improve during his stay in the hospital. He was discharged against advice on the 31st hospital day.

DISCUSSION

E. rhusiopathiae is an organism widely distributed in various species of animals and in nature. The organism is pathogenic not only to swine but also to man. It was first isolated in 1884 by Resenbach, from a man with erysipeloid (Klauder 1983; Woodbine 1950). In man the organism causes three well-defined clinical diseases: a mild, localized cutaneous form, a severe generalized cutaneous form, and a septicemic form, with or without cutaneous involvement, which is sometimes complicated by endocarditis (Ehrlich 1946). According to Freland (1986) only about 60 cases of the spetic form have ever been reported. Rarer infections include cerebral involvement (Silberstein 1965) and septic shock (Agnibene *et al.* 1985).

It has been believed that the diagnosis has often been missed (Price and Bennett 1951). It can be a complicated diagnostic problem (Cabot 1978). In Korea a case of skin infection was reported (Kim *et al.* 1981), but no other human infection caused by it has been

reported. The present case was one of endocarditis without known skin infection. According to Grieco and Sheldon (1970) endocarditis can occur without primary or secondary skin lesions.

The infections have been reported most frequently in abattoir workers and fish handlers (Klauder 1938; Russel and Lamb 1940). The organism invades mostly through wounds of the hands. Our patient's occupation was livestock farming. It was not known whether he had an injury before the infection. The patient had various other diseases, such as cirrhosis of the liver, diabetes, and tuberculosis, but apparently he had had no knowledge of having damaged heart valves, prior to the present illness. Endocarditis due to this organism is known to occur more freuqently in male patients with various underlying diseases, heavy drinking habits (Schiffman and Black 1956; McCracken *et al.* 1973), and previous valve damage (Grieco and Sheldon 1970). The endocarditis may be acute or subacute, and in the cases of some patients it has taken up to 6 months for the diagnosis to be made. Our patient had intermittent faver for 40 days. It may well be that he had the infection all of that time. His splenomegally may also be related to the infection (Grieco and Sheldon 1970). Klauder *et al.* (1943) reported a case with sepatic infarction of the spleen.

For the treatment of this infection, penicillin G has been used effectively since the early antibiotic era (Ehrlich 1946; Procter 1965). The present patient was treated with antimicrobial agents, including 10 million units of penicillin G per day. His temperature returned to normal on the second hospital day. The isolate was susceptible to penicillin G and the cephalosporins by the disk diffusion method. Sneath *et al.* (1951) reported a very low minimum inhibitory concentration of penicillin G, i.e., 0.06-0.12 μg/ml. High susceptibility was again observed in the isolates of 1980-82 (Takahashi *et al.* 1984). The result showed an MIC of ⩽ 0.1 μg/ml each of penicillin G and ampicillin.

The organism seems to be not difficult to culture (McCarty and Bornstein 1960; McCracken *et al.* 1973; Townshand *et al.* 1973), but difficult to identify. In samples of our patient, the growth was detected after a 2-day incubation period, in all of the three TSB and three BTM bottles. The growth produced a moderate turbidity in the broth, which was not difficult to detect macroscopically. Stained smears of the culture showed gram-positive bacteria in arrangements of singles and chains. The small, barely distinguishable alpha-hemolytic colonies on subcultured blood agar plates and negative catalase were reminiscent of streptococci. However, repeated Gram stains showed that the organism was not a coccus. On further tests, the isolate was found not to be *Listeria* nor diphtheroid in being catalase negative, and not beta-hemolytic. Inoculation of TSI agar showed the production of H_2S, which became a definite clue to the identification of *E. rhusiopathiae*. Other gram-positive organisms, such as streptococci and *Bacillus* sp. are rarely known to produce H_2S (Weaver 1985). Once *E. rhusiopathiae* was suspected, it was not difficult to confirm the identification by biochemical tests. All of the characteristics were typical of *E. rhusiopathiae* (Seeliger 1974; Weaver 1985). The human isolate by Kim *et al.* (1981) was different from ours in that it produced luxuriant, yellowish, and mucoid colonies, negative H_2S, and a weakly positive catalase reaction.

Although *E. rhusiopathiae* septicemia is very rare, clinical microbiologists should bear in mind the possibility that the bacillus is *Erysipelothrix* when a gram-positive bacillus is isolated from the blood of patients whose occupation involves contact with fish or animals.

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