Septicemia Caused by DF-2

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Fatal septicemia due to an unidentified gram-negative rod developed in a 60-year-old alcoholic. Infection due to this organism has been reported only rarely in the medical literature. Like Pasteurella multocida, this organism is related to dog bites, is gram negative, and is sensitive to penicillin.

DF-2 is the designation given by the Center for Disease Control to an unidentified gram-negative rod that has rarely been reported as a human pathogen (2, 3).

The organism is a gram-negative bacillus that has been isolated from the blood of patients, most of whom have had underlying diseases which impaired host defenses. The clinical syndromes seen most commonly were cellulitis, septicemia, meningitis, and endocarditis.

The purpose of this report is to document further the ability of this organism to cause invasive disease in the human host.

Patient summary. The patient was a 60-year-old black male who was admitted to the hospital because of a 3-day history of confusion, cough, sputum production, and fever. His past medical history included the diagnosis of chronic bronchitis and chronic alcohol abuse. On physical exam he was febrile (temperature, 40.5°C) with blood pressure 112/78 and respiration 40/min; pulse was 128/min and regular. The patient was lethargic and disoriented. Poor oral hygiene was noted, as well as bilaterally decreased breath sounds with occasional rhonchi and wheezing and regular tachycardia without murmurs. There were no localizing neurological signs. Laboratory work showed hematocrit, 47%; hemoglobin, 14.8 g/100 ml; and leukocyte count, 13,700/mm³ with 66% polymorphonuclear leukocytes, 29% stabs, 2% lymphocytes, 2% monocytes, 1% basophils, and normal platelets. Spinal fluid was normal and sterile. Urinalysis demonstrated 8 to 10 leukocytes per high-power field, 35 to 40 erythrocytes per high-power field, and 4+ glucose; serum potassium was 5.8 mEq/liter, chloride was 75 mEq/liter, CO₂ was 22 mEq/liter, and amylase was 120 U/ml; prothrombin time and thyroid function studies were normal. Bilirubin was 3.8 mg/ml with 2.8 mg/ml direct reacting, blood urea nitrogen was 57 mg/dl, creatinine was 5.8 mg/dl, creatine phosphokinase was greater than 7,200 U/liter, lactic dehydrogenase was greater than 3,000 U/liter, and serum glutamic oxalacetic transaminase was greater than 3,000 U/liter. Alkaline phosphatase was 127 U/liter. Multiple chest X rays demonstrated no active disease. There was no evidence of midline shift on the electroencephalogram, and multiple electrocardiograms demonstrated sinus tachycardia with left anterior hemiblock.

The patient was presumed septic and was treated with nafcillin and gentamicin, to which clindamycin was later added. He also received aminophyllin, nasal oxygen, thiamine, and corticosteroids.

The day of admission the patient suffered a cardiopulmonary arrest and deteriorated rapidly thereafter, developing renal failure, metabolic acidosis, respiratory failure, and hypotension. On day 2 of hospitalization, three sets of blood cultures were reported growing gram-negative rods in both the aerobic and anaerobic bottles. The nafcillin was switched to ampicillin, and the gentamicin was switched to amikacin. On day 3 of hospitalization, the patient expired. No autopsy was obtained.

The organism recovered from this patient's blood is designated as DF-2 by the Center for Disease Control, Atlanta, Ga. It is the same as the organism described in references 2 and 3 and as yet is unidentified.

Our organism grew in 1 day in both the Bactec 6A aerobic broth and in Bactec 6B prereduced enriched tryptic soy broth. It grew on subculture in 1 day and on chocolate agar and also grew on chocolate Mueller-Hinton. It was not grown on blood agar. The colonies were small, round, gray, and glistening; the organisms microscopically were long, pleomorphic gram-negative rods.

The organism was catalase and oxidase positive and negative for nitrate, indole, urea, and citrate. There was no growth on MacConkey agar. It formed acid in glucose, maltose, and lactose, and growth was enhanced by CO₂.

Sensitivities (with Schaedler medium) were performed on the organism and they were as follows: gentamicin minimal inhibitory concen-
tration, 8.0 μg/ml; penicillin, 0.25 μg/ml; tetracycline, 0.12 μg/ml; cephalothin, 4.0 μg/ml; chloramphenicol, 2.0 μg/ml; erythromycin, less than 0.03 μg/ml; clindamycin, less than 0.03 μg/ml; carbenicillin, 1.0 μg/ml; cefoxitin, 1.0 μg/ml; and vancomycin, 2.0 μg/ml.

The site of origin of this patient's septicemia is not clear, although acute endocarditis is certainly possible. Regarding the common clinical features mentioned in reference 3, there was no evidence in this patient of a recent dog bite (although he did have a pet collie), cellulitis, meningitis, joint effusion, or pulmonary infiltrates. The dramatic enzymatic abnormalities are not specific and could indicate extensive necrosis of cardiac muscle, skeletal muscle, brain, erythrocytes, or liver.

The antibiotic sensitivities are instructive and are similar to those reported in the original series. Although the response to treatment in the reported survivors was "prompt," our patient was treated with effective antibodies from the time of admission but deteriorated nevertheless.

Of the possible predisposing illnesses mentioned in the patients previously reported, splenectomy, alcoholism, and chronic lung disease are prominent. Our patient may have been compromised by both alcoholism and chronic obstructive pulmonary disease. Dog exposure appears to be important in acquisition of infection due to DF-2, and in fact this organism has been recovered from oral fluids of dogs (1).

Awareness of this organism is important; it is a gram-negative pathogen for which aminoglycoside therapy may not be optimal (our isolate had a minimal inhibitory concentration of gentamicin of 8.0 μg/ml, and other experience [3] has shown resistance to gentamicin and kanamycin). The penicillins, erythromycin, and clindamycin appear to be effective in vitro. It is interesting to note that Pasteurella multocida, another pathogen related to dog bites, is also a gram-negative organism that is sensitive to penicillin.

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LITERATURE CITED