YERSINIA ENTEROCOLITICA INFECTION IN A COMPROMISED HOST

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SYNOPSIS

Infections with Yersinia enterocolitica appear to be very rare in Singapore. This report describes a strain of Yersinia enterocolitica serotype 3 isolated from the blood cultures of a 52-year-old man with liver cirrhosis in 1975. This is the first and only isolation of the organism in Singapore so far.

INTRODUCTION

The genus Yersinia, named for the French bacteriologist A.J.E. Yersin, who isolated the causative agent of plague in 1894, contains 3 species: Y. pestis, Y. pseudotuberculosis and Y. enterocolitica. The genus Yersinia is now classified as a member of the family Enterobacteriaceae.

The earliest strains of Y. enterocolitica were discovered in the USA between the years 1923 and 1957. All of them (about 15 in number) were isolated from man and were classified at the time as atypical strains of Pasteurella pseudotuberculosis.

The first human cases of infection with Y. enterocolitica were diagnosed in France, Belgium and Sweden from 1963 onwards.

So far, Y. enterocolitica has been isolated from man or animals in countries in Europe, in the Americas and in Asia (Iran, Israel and Japan). (WHO Chronicle 1976).

This report describes the first isolation of a strain of Y. enterocolitica from a man with liver cirrhosis in Singapore.

CASE REPORT

The patient, a 52-year-old Chinese man was admitted to hospital with a three-week history of progressive yellowness of the eyes, abdominal discomfort and ankle oedema. The ankle oedema subsided after injection by a General Practitioner prior to admission. There was no vomiting, diarrhoea or abdominal pain.

On examination, patient was alert with a pulse rate of 80/min, blood pressure 120/70 and a temperature of 38.2° C. The conjunctivae appeared jaundiced and spider naevi were present over his chest. There was no palmar erythema, ankle oedema or liver flap. No abnormalities were detected in his heart and lungs. The liver was palpable 4 cm below the right costal margin, smooth and non-tender. The spleen was enlarged 2 cm, firm and smooth. He had minimal ascites. The patient was an alcoholic consuming 2-3 glasses of stout a day for several years.

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Laboratory results were as follows: Hb 13.6 gm/100 ml; leucocyte count 9,500 per cmm; with 99% polymorphonuclear cells and 1% lymphocytes. Platelet count was 50,000 per cmm; Prothrombin time 40 secs (control 18 secs).

Urinalysis showed occasional RBCs, occasional WBCs and occasional epithelial cells. Albumin was trace. There were no casts or crystals.

Serum sodium was 126 mmol/L, serum potassium 2.6 mmol/L, serum chloride 92 mmol/L; serum bilirubin 12.5 mgm%; alkaline phosphatase 2.1 units/L; serum albumin 2.6 gm %, globulin 5.6 gm %; serum glucose 94 mg %; serum urea 49 mg %; SGPT 104 units/L; sensitised erythrocyte lysis test — negative in 1/25; alpha-foetoprotein was negative by I.D. No stone was visualized on X-ray of his abdomen.

CLINICAL COURSE

Patient was treated for his liver condition and started on ampicillin. Two blood cultures taken showed pure growth of gram-negative rods identified as Yersinia enterocolitica. The organism was sensitive to gentamicin, tetracycline, kanamycin, streptomycin, chloramphenicol and trimethoprim-sulphamethoxazole but resistant to pencillin G, ampicillin, carbenicillin, erythromycin and cephaloridine. Patient however went into hepatic coma and died before antibiotic therapy could be changed to one to which the organism was sensitive.

BACTERIOLOGY

The organism was able to grow on human blood agar and MacConkey agar. Colonies were tiny after overnight incubation. After 48 hours' incubation, colonies on blood agar were 1-2 mm in diameter, circular and greyish-white in colour. No haemolysis was seen. Almost all the Y. enterocolitica strains isolated from various parts of the world had been reported to be motile at 25°C and nonmotile at 37°C. Our isolate differed in that it was nonmotile at both 37°C and 25°C. Results of the biochemical reactions carried out on the organism are listed in Table I.

Results of Antibiotic sensitivity tests carried out using the Kirby-Bauer technique are shown in Table II.

Confirmation of the identification of the bacterial isolate was done by Dr. M. Ohashi, Chief Bacteriologist of Metropolitan Research Laboratory of Public Health in Tokyo, Japan. He reported the strain as belonging to Yersinia enterocolitica serotype 0 : 3.

TABLE I

Biochemical Reactions of Yersinia Enterocolitica Isolate

TEST	RESULT
Oxidase	—
Indole	—
Citrate (Simmons)	—
H_2S	—
Urease	+
Methyl red	+
Voges-Proskauer	—
Nitrate reduction	+
β-galactosidase	+
Phenylalanine deaminase	—
Lysine decarboxylase	—
Ornithine decarboxylase	+
Arginine dihydrolase	—
Aesculine hydrolysis	—
Fermentation of:—	
Glucose	Acid, no gas
Lactose	—
Sucrose	Acid
Mannitol	Acid
Maltose	Acid, 48 hours
Sorbitol	Acid
Xylose	Acid, 48 hours
Rhamnose	—
Adonitol	—
Melibiose	—

TABLE II

ANTIBIOTIC SENSITIVITY PATTERN OF YERSINIA ENTEROCOLITICA ISOLATE

ANTIBIOTIC	RESULT
Penicillin G (10 units)	Resistant
Erythromycin (15 ug)	Resistant
Carbenicillin (100 ug)	Resistant
Ampicillin (10 ug)	Resistant
Cephaloridine (30 ug)	Resistant
Gentamicin (10 ug)	Sensitive
Kanamycin (30 ug)	Sensitive
Streptomycin (25 ug)	Sensitive
Tetracycline (30 ug)	Sensitive
Chloramphenicol (30 ug)	Sensitive
Trimethoprim (1.25 ug). Sulphamethoxazole (23.75 ug)	Sensitive

DISCUSSION

Yersinia enterocolitica has been isolated from a variety of sources such as water, milk, ice-cream, mussels, oysters etc. Several animal species harbour it, including dogs, pigs, hares and chinchillas.

Human infection has several clinical manifestations. The most prevalent is acute gastrointestinal illness. Two thirds of the cases occur in children under 7 years of age. Diarrhoea is sometimes the only symptom or it may be accompanied by diffuse abdominal pain or sometimes fever. Occasionally the acute infection is confined to the right iliac fossa and resembles appendicitis. In such cases at operation not just an inflamed appendix but principally a terminal ileitis with mesenteric adenitis will be found.

Less frequently other clinical entities like erythema nodosum, Reiter's syndrome, myocarditis and arthritis have been linked with Y. enterocolitica by isolation and/or serological evidence (Arvastson B. et al 1971; Solem, J. H. et al 1971; Ahvonen, P. et al 1969). There is also a rare form with cutaneous lesions accompanied by local adenopathy or abscesses (Ase-Gerd H. et al 1974).

Septicaemia due to Y. enterocolitica is relatively rare. In 1976, Spira, J. et al published a review of 34 reported cases of Y. enterocolitica septicaemia (including his own case). Analysis showed many of the patients had underlying disease of which hepatic cirrhosis was the most common. Other underlying diseases included diabetes mellitus, thalassemia major, aplastic anaemia, leukaemia, etc. The overall mortality for Y. enterocolitica septicaemia was 38%. However, in patients with cirrhosis of the liver, mortality was 67%. The patient in this case had liver cirrhosis as his underlying disease and he died before appropriate antibiotic treatment could be given.

Yersinia enterocolitica has been serotyped based on 34 different thermostable 0 antigens. The most common European sero-types in man are types 3 and 9. Serotype 3 is also common in Japan. In the United States however, multiple numbers of serotypes prevail. The strain of Y. enterocolitica isolated from the patient in this report belonged to serotype 0 : 3.

Some investigators consider the dog to be the most likely source of infection for man, while others consider the pig to be the main source of human infection particularly in Europe, South Africa and Canada on the basis of isolation of serotype 0 : 3 organisms of similar phage type from man and pig (Mollaret, H. H. 1971). The source of this organism in our patient is unknown, as so far Yersinia enterocolitica has not been isolated from specimens of animal origin in Singapore (Liow, T.M. 1979).

The portal of entry of Y. enterocolitica appears to be the digestive tract. This corresponds well with the frequency of digestive symptoms, the high incidence of lesions in the ileum, appendix and mesenteric lymph nodes and the seasonal incidence which tends to follow that of the other gastrointestinal diseases (Rabson, A.R. 1972). Our patient had no complains of digestive symptoms nor had he any of the lesions mentioned above. It is therefore uncertain what the portal of entry might have been.

Infections due to Yersinia enterocolitica appear to be very rare in Singapore. Although the laboratory personnel are fully aware of the existence of this organism yet there has not been a single isolation of Yersinia enterocolitica either from human or animal since the first isolation of the strain responsible for this case in 1975.

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