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Yersinia pseudotuberculosis Septicemia Report of a Case

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Yersinia pseudotuberculosis is known to cause septicemia, mesenteric lymphadenitis, enteritis and erythema nodosum. Most of the infections were found in European countries, but none in Korea till now. For the first time in Korea *Y. pseudotuberculosis* was isolated form a 51-year-old male with liver cirrhosis. The patient showed chills, abdominal pain and diarrhea followed by a comatose state. The organism was isolated from both blood and peritoneal fluid. The isolation and identification were difficult as the organism grew slowly and many of the characteristics were similar to other enteric bacilli. The isolate was susceptible to all antibiotics tested in vitro, but our chemotherapy with ampicillin and kanamycin did not save the patient's life.

Yersinia pseudotuberculosis a gram-negative rod classified in the family Enterobacteriaceae, is known to cause various clinical diseases such as septicemia, mesenteric lymphadenitis, enteritis and erythema nodosum.

Most of the infections were recognized in Europe and Great Britain (Knapp, 1958; Mair *et al*, 1960; Daniels, 1962; Borowski *et al*, 1971). In other countries such as United States of America, Canada (Finlayson and Fagundes, 1971; Hubbert *et al*, 1971; Delorme *et al*, 1974; Randall and Bannatyne, 1975) and Japan (Kanazawa, 1977), the infections have recently been increasingly recognized. But, to the authors' knowledge, there has never been any reported case of this infection in Korea. Recently we isolated a strain of *Y. pseudotuberculosis* from both blood and peritoneal fluid of a 51-year-old male patient with liver cirrhosis. The bacteriological findings together with a brief clinical description are presented.

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CASE REPORT

On January 1 1979, a 51-year-old man(unit no. 570550) was transferred from a private clinic to Yonsei Medical Center because of his dull mentality. Five days prior to his admission he had fever, chills, severe left lower abdominal pain, diarrhea and general body ache. He had abdominal distension for 3 days and dull mentality for 1 day.

In November 1974 the patient had his first admission to this hospital under the diagnosis of liver cirrhosis. Since then a dependant edema has been noted from time to time. He was found icteric when he was admitted in 1974 and again 1977.

On admission, the physical examination revealed slightly elevated body temperature

of 37.2C, rapid pulse of 152/minute and low blood pressure of 85/50 mm Hg. The body was wasted and he appeared to have a dull mentality, slightly distended facial capillaries, slightly icteric sclerae and a markedly dehydratedtongue. The abdomen was moderately distended and tense. Also found were tenderness of the left lower abdomen, shifting dullness. decreased bowel sounds and herniation of umbilicus. The clinical impressions were impending coma, liver cirrhosis with ascites, and enterocolitis.

Leukocyte count was 13,300/mm^3 with 19% stabs, 75% segmented neutrophils, 5% lymphocytes and 1% eosinophils. Moderate toxic granules were noted and hematocrit was 45%. Urinalysis revealed one plus protein, occasional WBC and 10-20 RBC/HPF. A few finely granular casts were also found. Urobilinogen and bilirubin were positive. Some of the abnormal blood chemistries were as follows: CO_2 content(14 mmol/1), Ca(7.6 mg/dl), total protein(4.6 g/dl) and albumin (1.8 g/dl) were decreased, and BUN(67 mg/dl), creatinine(5.0 mg/dl), bilirubin (5.5 mg/dl), inorganic phosphorus(7.9 mg/dl), SGPT (300 IU/l) and LDH(585 IU/1) were increased.

HBs Ag was positive with RIA technique. The titer of Widal test was 1:20 for *Salmonella typhi* and less than 1:20 for both *S. paratyphi-A* and *S. shottmuelleri*. The peritoneal fluid obtained by paracenthesis on the 2nd hospital day was yellowish and slightly cloudy. The protein content was 0.96 g/dl and the WBC was 1,350/mm^3 with 74% neutrophils and 26% lymphocytes. Culture of the fluid yielded *Y. pseudotuberculosis*. A blood culture done on the first hospital day also yielded the same organism. A stool culture for *Salmonella* and *Shigella* was negative.

Throughout his hospitalization, he remained comatose. Urine output was almost absent and the highest body temperature was 38.5C. Ampicillin and kanamycin were given, but the patient died of a respiratory failure on the 3rd hospital day.

METERIALS AND METHODS

Blood culture was done on the 1st hospital day. Fifty ml each of Tryptic soy broth (TSB) and Brewer thioglycollate broth were admixed with 5 ml of blood. Peritoneal fluid taken on the 2nd hospital day was inoculated to blood agar, MacConkey agar and thioglycollate broth. The plates were incubated in CO_2. All of the incubation temperatures were 35C. Blood culture bottles were subjected to a 1-day blind subculture and to daily macroscopic observation according to the routine procedures. Cultural and biochemical characteristics of the isolate were determined by a conventional method(Sonnenwirth, 1974). Antibiotic susceptibility was tested by the Kirby-Bauer disc diffusion method.

RESULTS

Growth of the bacteria was noted in a TSB blood culture bottle after 3-day incubation. On the blood agar plate inoculated with the peritoneal specimen, light growth was noted after 24-hr incubation. A 48-hr incubation of the thioglycollate broth did not show any growth.

The organisms were relatively large gram-negative rods. On blood agar the colonies were small and grayish. Subcultures on MacConkey and SS agar showed small color-

Table 1. Cultural and biochemical characteristics of the isolate

Characteristic	Sonnen-wirth*	Isolate no. 79-1-19
Motility, 22C	+	+
37C	−	−
Urease	+	+
Phenylalanine deaminase	−	−
Glucose	A	A
Lactose	−	−
Mannitol	A	A
Sucrose	−	−
Maltose	A	A
Rhamnose	A	A
Salicin	A	A
Sorbitol	−	−
Xylose	A	A
Cellobiose	−	−
Raffinose	−	−
Arabinose	A	A
Melibiose	A	A
Trehalose	A	A
Adonitol	A(−)	A(10 day)
Catalase	+	+
Oxidase	−	−
Citrate	−	−
H_2S(TSI)	−	−
ONPG	+	+
Nitrate reduction	+	+
Indole	−	−
MR	+	+
VP, 37C	−	−
Lysine decarboxylase	−	−
Arginine dihydrolase	−	−
Ornithine decarboxylase	−	−
Esculin hydrolysis	+	+
Gelatine hydrolysis	−	−

* Manual of clinical microbiology, 1974.

less colonies after 24-hr incubation. TSI reactions were alkaline slant and acid butt. Both H_2S and gas were negative. MIO medium showed negative reactions for motility, indole production and ornithine decarboxylase. Both tests of Simmon citrate and oxidase were negative. Other cultural and biochemical characteristics were as shown in table 1. Based on these reactions the isolate was identified as *Y. pseudotuberculosis*. The identification was later confirmed by Dr. R. E. Weaver of the Center for Disease Control, USPHS. The isolate was susceptible to all of the antibiotics tested(Table 2).

Table 2. Antibiotic susceptibility of the isolate

Antibiotic	Susceptibility
Ampicillin	S*
Cephalothin	S
Chloramphenicol	S
Colistin	S
Gentamicin	S
Kanamycin	S
Streptomycin	S
Tetracycline	S

* Susceptible.

DISCUSSION

Most of the reported infections of *Y. pseudotuberculosis* and *Y. enterocolitica* were from European countries, although one case was found in Japan as early as 1913(Kanazawa, 1977).

No doubt the infection is a rare one and we believe the present case must be the first one in Korea.

The limited number of reported cases in the past and the slowly increasing isolations in recent years may well be due to the technical overcoming of the difficulties in the isolation and identification of the organism. The bacteria grow slowly, often requiring over 24-hr incubation. The similarity of the biochemical characteristics to other enteric

bacilli may result in misidentification. We had difficulties with our isolate, too. The growth from blood required 3-day and that from peritoneal fluid 2-day incubation. Growth was not detected on MacConkey agar as the incubation was terminated after 24 hours.

It is customary to use a minimal test scheme to identify clinical isolates of gram-negative bacilli. Our procedure is to use a minimum set of TSI, MIO and Simmon citrate medium, and the majority of the isolates are correctly identified. However, this isolate showed TSI reactions of alkaline slant and acid butt only, and reactions on MIO and Simmon citrate were all negative, necessitating more tests. With further cultural and biochemical reactions we could identify the isolate as a typical *Y. pseudotuberculosis*.

Before 1954, the only known type of this infection was usually fatal acute septicemia (Knapp, 1958), and only 29 of such cases were reported until 1975(El-Maraghi, 1979). Later, mesenteric lymphadenitis was shown to be the more frequently encountered form of infection. Other clinical manifestations of this organism include enteritis and erythema nodosum(Wilkinson *et al*, 1969). The initial symptoms of our case were fever, chills, left lower abdominal tenderness, and diarrhea. We assume these symptoms may well be directly related to the infection of *Y. pseudotuberculosis* because the organism was isolated from the peritoneal fluid. The route of infection of *Y. pseudotuberculosis* is geneally considered to be the gastrointestinal tract (Daniels, 1961; Hubbert *et al*, 1971). In this patient typhoid fever was also suspected, but cultures of blood and stool did not yield any enteric pathogen and the titer of Widal test was not significant. The coma might be caused by the infection itself rather than by the cirrhosis.

The patient had been suffering from liver cirrhosis. Yamashiro *et al*(1971) and Marlon and Merigan(1971) reviewed septicemic infections and found that many of the patients with underlying diseases had mostly pathologic findings of liver.

The sources of infection of *Y. pseudotuberculosis* is considered to be various mammals and birds(Mair, 1965). In our patient, history of animal contact was not known. Our isolation of *Y. pseudotuberculosis* has now documented the presence of this infection in Korea. Therefore in the future we should keep in mind the enteritis and mesenteric adenitis from this organism and from *Y. enterocolitica*(Winblad *et al*, 1966; Blattner, 1969). Enteritis and mesenteric adenitis are known to be the more common infections and are often misdiagnosed as appendicitis, leading to unnecessary operations(Jasson *et al*, 1968; Braunstein *et al*, 1970).

Yersinia has been reported susceptible to many antibiotics and our isolate was no exception. But despite of our patient's receiving ampicillin and kanamycin, he died on the 3rd hospital day. Septicemic yersiniosis is known to be a highly fatal disease despite adequete antibiotic therapy(Marlon *et al*, 1971; Yamashiro *et al*, 1971; Brodie *et al*, 1973).

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