

## Two Cases of *Campylobacter fetus* Septicemia

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*Campylobacter fetus* subsp. *intestinalis* was isolated from the blood of two different patients. One patient was a 46-year-old male with liver cirrhosis and the other a 44-year-old male with colon carcinoma. These are the second and third documented infections of this kind in Korea. Difficulties of their isolation were well illustrated. For instance, the growth was detected after a long incubation of 4 to 6 days. All of the 3 blood cultures from the carcinoma patient, but only 2 of 3 specimens from the other patient, yielded the organism.

*C. fetus* is capable of causing infection not only in animals but also in human beings. Though various human infections have been reported from many parts of the world, the incidence is decidedly low. Particularly in Korea there had been no reported case until 1970 when we made the first isolation from blood of a 39-year-old male with subacute bacterial endocarditis (Bokkenheuser, 1970; Chong and Lee, 1970).

For the following several years, there was no single new isolation of this organism at our laboratory, but recently we found 2 successive cases of this infection within a period of 6 months. Blood cultures of a 46-year-old male with liver cirrhosis and of a 44-year-old male with a colon carcinoma yielded *C. fetus* subsp. *intestinalis*. This report describes brief clinical histories of these two cases and the bacteriological characteristics of the isolates.

### CASE REPORTS

#### Case 1.

A 46-year-old male was admitted to our hospital on Jan. 31, 1978 with chief complaints of fever and fatigue for 2 months. Two days prior to the admission, he began to feel shortness of breath with right subcostal discomfort. Seven years ago, he developed a chronic hepatitis. Physical examination on admission revealed telangiectasis, spider angioma and palmar erythema. Both liver and spleen were palpable. Chest X-ray showed a massive pleural effusion in the right lower lung field.

Abnormal laboratory findings were an inverted ratio of albumin to globulin, 2.2 and 4.4 g/100 ml, and an elevated bilirubin, total 2.1 and direct 0.6 mg/100 ml. Prothrombin time was 14.3 s or 84% of normal. A WBC count of 3,100/ $\mu$ l with 74% neutrophils and a thrombocyte count of 44,000/ $\mu$ l were report-

\* Received April 20, 1979.

ed. HBs Ag was positive by counterimmuno-electrophoresis.

Three blood cultures were taken on the 4th hospital day when the body temperature was 38.5°C. Two out of 3 blood cultures yielded *C. fetus*. The patient was put on ampicillin therapy and recovered from the infection.

### Case 2.

A 44-year-old male was admitted to our hospital on July 18, 1978 with chief complaints of jaundice and abdominal distension for 3 months. Approximately one year before, the patient was admitted to a hospital in America because of a traffic accident and a colon carcinoma was found incidentally. He received radiation therapy.

Physical examination on the present admission revealed an icteric sclera and a markedly distended abdomen. A hard, tender and nodular liver was palpable 3-finger breadths below the right costal margin. Marked pitting edema was present on the extremities. Chest X-ray disclosed a metastatic tumor in both lungs. WBC count was 33,900/ $\mu$ l with 96% segmented neutrophils. Body temperature was 36.6°C.

Three blood cultures were taken and *C. fetus* was isolated from each of them. The patient refused to stay in the hospital and it was learned later that he expired soon after his discharge.

## MATERIALS AND METHODS

For blood cultures, tryptic soy broth (TSB) and Brewer thioglycollate medium (BTM), prepared from dehydrated products (Difco), were used. Sodium polyanethol sulfonate was added to TSB in a concentration of 0.05%. To each culture bottle was dispensed 50 ml

of medium to be admixed with 5 ml of the blood specimen. Cultures were incubated at 35°C and inspected daily.

To determine the characteristics of the campylobacter isolates, thioglycollate medium without dextrose or indicator (Difco) was used as the base medium, to which appropriate ingredients were added such as 0.01% potassium nitrate, 1.5 and 3.5% salt, 0.02% cystine HCl, or 1% Oxgall (Difco) for nitrate reduction, salt tolerance, H<sub>2</sub>S production by lead acetate-method or bile tolerance respectively (Holdeman *et al.*, 1977). Other tests were done according to routine procedures (Lennette *et al.*, 1974).

## RESULTS

Two blood cultures from the liver cirrhosis patient showed faint cloudiness, one in TSB after 4-day and the other in BTM after 6-day incubation (isolate no. 78-2-94). Stained smears of the culture showed poorly staining gram-negative rods. They stained well with carbolfuchsin, and appeared as slightly curved rods. Also observed were a few "sea gull" and spiral forms. On standing a few more days, the original culture showed a thin film and sediment. A stained smear of this showed abundant spiral forms. A hanging drop preparation showed both rapidly moving short bacilli and somewhat sluggish spiral forms. The isolate grew well on blood agar, both in a candle jar and in a GasPak jar (BBL), but not in an aerobic atmosphere. In a semisolid medium the growth was heavier just below the surface, indicating the microaerophilic nature of this organism. After 3-day incubation in a candle jar some colonies reached a size of 3 mm. They were translucent and light buff in color.

All of the 3 blood cultures from the colon carcinoma patient showed faint cloudiness with some film in both TSBs and BTMs after 6-day incubation (isolate no. 78-7-1054). This isolate had the same characteristics described for the previous case except that on the blood agar incubated in air for 2 days many small colonies and some larger ones developed.

Other characteristics of both isolates are shown in table 1. Based on these characteristics, they were identified as *C. fetus*. The strains were sent to the CDC, USA for further studies and our identifications were confirmed and the subspecies were determined as *C. fetus* subsp. *intestinalis*.

Antibiotic susceptibility of the isolates was

Table 1. Characteristics of the *C. fetus* isolates

Test	Isolate	
	78-2-94	78-7-1054
Acid from carbohydrate <sup>a</sup>	- <sup>b</sup>	-
Catalase	+ <sup>b</sup>	+
Oxidase	+	+
Nitrate reduction	+	+
H <sub>2</sub> S, SIM	-	-
Lead acetate paper	-	± <sup>b</sup>
Growth, 1% glycine	+	+
1.5% salt	+	+
3.5% salt	-	-
1% bile	±	+
25°C	+	+
42°C	-	-
Esculin hydrolysis	-	-
Indole	-	-
Urease	-	-
Motility	+	+
Growth, Aerobic	-	±
Candle jar	+	+
GasPak jar	+	+
Hemolysis	-	-

<sup>a</sup> Glucose, lactose, maltose, sucrose.

<sup>b</sup> +, positive or growth; -, negative or no growth; ±, weak or poor growth.

Table 2. Antibiotic susceptibility of the *C. fetus* isolates

Antibiotic	Isolate	
	78-2-94	78-7-1054
Ampicillin	0.5 <sup>a</sup>	0.5
Cephalothin	≤0.25	≤0.25
Chloramphenicol	1.0	2.0
Colistin	8.0	4.0
Gentamicin	≤0.25	≤0.25
Kanamycin	1.0	2.0
Streptomycin	≤0.25	≤0.25
Tetracycline	0.5	0.5

<sup>a</sup> Minimum inhibitory concentration in µg/ml.

tested by a broth dilution method using Mueller-Hinton broth. The results read after 4-day incubation in a CO<sub>2</sub> incubator are shown in table 2.

## DISCUSSION

Actual *C. fetus* human infection is considered more prevalent than is indicated by the rarity of reported cases (Bokkenheuser, 1970). The limited number of reported cases is believed due to the difficulty in the isolation of the organism (Willis and Austin, 1966). The recent more frequent isolations of this organism from clinical material was considered to result from the awareness of this infection and from the use of more favorable cultural conditions (Brown and Sautter, 1977). Our experience supports the difficulty of isolation. The second day blind subculture did not show any growth and it took 4- to 6-day incubation before showing faint cloudiness. Although all of the 3 specimens, for 3 TSBs and 3 BTMs, yielded growth in one of the patients, the other patient showed growth in only 2 of 3 samples, one in a TSB and the other in a BTM.

It was interesting that 2 isolations were

obtained within a period of only 6 months. Moreover our technique of blood culture did not change for the last several years and a  $\text{CO}_2$  atmosphere was not provided. Both of our patients had underlying conditions and it can be assumed that the recent increase of compromised hosts has resulted in more frequent infection with this organism.

In Asia there had been no report of *C. fetus* isolation until 1969 (Bokkenheuser, 1970). However, our previous case (Chong and Lee, 1970) and one of the present patients documented the presence of this infection in this part of the world. The second patient of the present report spent some time in America and it was impossible to trace where the infection was acquired.

Infections with *C. fetus* were known to occur often in pregnancy and neonatal period (Eden, 1966), but the most frequent infections were reported among males above the age of 45 years and many of them had various underlying disorders (King, 1957; Toala *et al.*, 1970; Dazu *et al.*, 1976). Our patients were 44- and 46- year old males and they had underlying diseases of liver cirrhosis and of a colon carcinoma.

Fever was reported to be the only common symptom found in the infections (King 1957). The liver cirrhosis patient had fever for 2 months and the body temperature was  $38.5^\circ\text{C}$  on the day of blood culture. Despite his fever and signs of septicemia, his WBC count was  $4,850/\mu\text{l}$  with 78% neutrophils, but this count was later shown to be a rather high one for this particular patient. After recovery from the infection the count was 1,800 to  $2,650/\mu\text{l}$  with 36 to 63% neutrophils. He was also found to have a low thrombocyte count of around  $44,000/\mu\text{l}$  during and after recovery from the infection. At the time of blood culture, al-

though the colon carcinoma patient showed signs of septicemia and an elevated WBC count of  $33,900/\mu\text{l}$  with 96% neutrophils, his body temperature was  $36.6^\circ\text{C}$ . This may indicate that the infection with this organism may cause no fever when it is overwhelming and the patient is in the terminal stage of malignancy.

The source of human infection of *C. fetus* is not definitely proven although an animal host has been suspected (King, 1957). The present cases were not known to have a history of animal contact.

King (1957) studied strains from human clinical materials and showed that there were two different kinds of campylobacter. Holdeman *et al.* (1977) list *C. fetus* subsp. *intestinalis* and subsp. *jejuni* as the organisms isolated from human clinical materials. A recent study in Britain showed that *C. fetus* subsp. *jejuni* was causing enteritis more frequently than other enteric pathogens (Skirrow, 1977). However, nonenteric isolation of campylobacter seems to remain rare. Not only were our present isolates subspecies *intestinalis*, but our previous strain (Chong and Lee, 1970) also was thought to be the same subspecies when its recorded characteristics were reevaluated according to the newer classification scheme (Holdeman *et al.*, 1977).

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#### REFERENCES

- Bokkenheuser V: *Vibrio fetus* infection in man. I. Ten new cases and some epidemiologic observa-

- tions. *Am J Epidemiol* 91:400-409, 1970
- Brown WJ and Sautter K: *Campylobacter fetus* septicemia with concurrent salpingitis. *J Clin Microbiol* 6:72-75, 1977
- Chong Y and Lee SY: *Vibrio fetus* human infection. -Isolation from a subacute bacterial endocarditis case-. *Yonsei Med J* 11:126-130, 1970
- Dazu VJ, Schur PH and Weinstein L: *Vibrio fetus* endocarditis in a patient with systemic lupus erythematosus. *Am J Med Sci* 272:331-334, 1976
- Eden AN: Perinatal mortality caused by *Vibrio fetus*. *Med Progress* 68:297-303, 1966
- Holdeman LV, Cato EP and Moore WEC: *Anaerobe Laboratory Manual*. 4th ed. Blacksburg Virginia, Virginia Polytechnic Institute and State University, 1977
- King EO: Human infection with *Vibrio fetus* and a closely related vibrio. *J Inf Dis* 101:119-128, 1957
- Lennette EH, Spaulding EH and Truant JP: *Manual of Clinical Microbiology*. 2nd ed. Washington, Am Soc Microbiol 1974
- Skirrow MB: *Campylobacter enteritis: A "new" disease*. *Brit Med J* 2:9-11, 1977
- Toala PA, McDonald A and Kass EH: Septicemia caused by *Vibrio fetus*. *Arch Intern Med* 126:306-308, 1970
- Willis MD and Austin WJ: Human *Vibrio fetus* infection. Report of two dissimilar cases. *Amer J Dis Child* 112:459-462, 1966
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