

# Shigella flexneri bacteremia: A case report

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Shigella bacteremia occurs so rarely that blood culture is useless for the laboratory diagnosis of dysentery. *S. flexneri* type 2 was isolated from a blood culture of a 3-year-old boy with clinical diagnosis of dysentery. A stool culture was negative for not only shigella but also other pathogenic bacteria. This was the only shigella-positive blood culture during the last 12½ years although more than 1,200 cases of bacteriologically proven dysentery were encountered.

One of the 4 bottles inoculated with 2 blood samples drawn on the 4th day of illness yielded numerous shigella and few *Klebsiella pneumoniae* colonies on subculture. On admission the patient was a moderately nourished boy with body temperature of 38°C. The leukocyte count was 10,200/μl with 29% neutrophils. No evidence of septicemia was noted. He was placed on antibiotics and fluid replacement. The patient was discharged in 6 days after full recovery.

**Key Words:** *Shigella flexneri* bacteremia

Shigella is a gram-negative nonmotile aerobic rod belonging to the family Enterobacteriaceae. In the past, dysentery was a very prevalent disease in Korea (Chun, 1970). Shigella remains to be an important enteric pathogen in spite of improved sanitation at the present time.

Shigellosis usually means intestinal infection because extraintestinal involvement is very rare (Barrette-Connor and Connor, 1970). Known extraintestinal infections include pneumonia, meningitis, osteomyelitis, eye infection, arthritis, nephritis and vaginitis (Whitefield and Humphries, 1967; Barrette-Connor and Connor, 1970). Shigella bacteremia is an extremely rare finding although a somewhat higher incidence is known among patients with underlying diseases (Dodd and Swanson, 1938; Rubin *et al.*,

1968; Spiers, 1974; Hallet and Scragg, 1978; Scragg and Rubidge, 1978). In contrast to salmonellosis, the rare involvement of blood stream by shigella makes blood culture usually useless for the diagnosis of dysentery.

To our knowledge, shigella bacteremia has not been reported in Korea despite the prevalence of dysentery. We isolated *S. flexneri* type 2 from a blood culture of a 3-year-old boy who was admitted with clinical symptoms of dysentery.

## CASE REPORT

A 3-year-old boy (unit no. 988438) was admitted to Yonsei Medical Center on the 16th of June 1981 with complaints of fever, vomiting and diarrhea of 3 days' duration. The stool

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contained mucus and blood. Physical examination revealed a moderately well nourished boy with a body temperature of 38°C. He looked acutely ill and dehydrated, but his mental state was clear. Throat was injected and cervical lymph nodes were palpable. Liver was palpable about 1 cm below the right costal margin. Direct tenderness was noted over the lower abdomen.

Hematologic findings included hemoglobin 11.5 g/100 ml, hematocrit 33%, WBC count 10,200/ $\mu$ l with 29% neutrophils, 52% lymphocytes, 9% monocytes, and 10% eosinophils. Sodium was 143 mEq/l, potassium 3.1 mEq/l, chloride 107 mEq/l and carbon dioxide content 19 mmol/l. Other blood chemistries and urinalysis were normal.

A stool culture and 2 blood cultures were done on the day of admission. Stool culture yielded no *Shigella*, *Salmonella*, *Yersinia*, *Vibrio parahaemolyticus*, or *Staphylococcus aureus*, but from one of the two blood cultures *S. flexneri* type 2 and *K. pneumoniae* were isolated.

The patient received fluid and antibiotic therapy of ampicillin and gentamicin. He was discharged on the 6th hospital day after complete recovery.

## MATERIALS AND METHODS

For blood culture, Fluid thioglycollate medium (FTM, Difco) and 0.05% sodium polyanethol sulfonate supplemented Tryptic soy broth (TSB, Difco) were used. A 10-ml amount of blood sample was drawn and 5-ml portions were inoculated into 50-ml bottles of FTM and TSB. Incubation was made at 35°C.

Salmonella and shigella cultures from stool were done by inoculating MacConkey and Salmonella and Shigella (SS) agar. Selenite broth was used as enrichment broth which was subcultured on SS agar after overnight

incubation. To screen salmonella and shigella, triple sugar iron agar slants were inoculated with colorless colonies on isolation plates.

Identification of shigella was done both by the conventional method (Martin and Washington Jr., 1980) and by the Micro-ID system (General Diagnostics, Morris Plains, N.J.). Serologic identification was done by slide agglutination (Edwards and Ewing, 1972) using shigella antiserum (Difco). Antimicrobial susceptibility was tested by the method of Kirby-Bauer disc diffusion test (NCCLS, 1979).

## RESULTS

*Shigella*, *Salmonella*, *Yersinia*, *V. parahaemolyticus* and *S. aureus* were not isolated from the stool culture. Among the 4 blood culture bottles inoculated with 2 specimens, one showed cloudiness after 3 days incubation. Subculture of this bottle yielded numerous colorless colonies and a few pink ones. The colorless colonies were identified as *S. flexneri* type 2 and the pink ones *K. pneumoniae*. The remaining 3 bottles were negative although the incubation time was extended to 2 weeks and frequent blind subcultures were made.

The isolate showed typical cultural and biochemical characteristics of *Shigella* (Table 1). The antimicrobial susceptibility pattern was that of currently isolated *S. flexneri* type 2 except for being susceptible to chloramphenicol (Table 2).

## DISCUSSION

Shigellosis usually means enteritis, because extraintestinal infections such as pneumonia, meningitis, eye infection, arthritis, osteomyelitis, nephritis and vaginitis are known to occur but extremely rarely. Bacteremia is so rare that until 1970 only 101 cases are found in the

Table 1. Characteristics of the *S. flexneri* isolate

Test	Result
Gas from glucose	— *
Acid from arabinose	—
inositol	—
lactose	—
sorbitol	—
$\beta$ -galactosidase	—
Nitrate reduction	+
Voges-Proskauer test	—
Motility	—
Indole	—
H <sub>2</sub> S (TSI)	—
Urease	—
Phenylalanine deaminase	—
Lysine decarboxylase	—
Ornithine decarboxylase	—
Esculine hydrolysis	—
Malonate utilization	—
Citrate utilization	—

\* +, positive; —, negative.

Table 2. Antimicrobial susceptibility of the *S. flexneri* isolate

Antimicrobial agent	Susceptibility
Amikacin	S*
Ampicillin	R
Cefoxitin	S
Cephalothin	S
Chloramphenicol	S
Gentamicin	S
Kanamycin	S
Tetracycline	R
Tobramycin	S
Co-trimoxazole	R

\* S, susceptible; R, resistant.

948 shigellosis patients during a 15-year period in Africa. The majority of the patients had severely malnourished conditions such as marasmus or kwashiorkor.

Although blood culture is not always done for patients with enteritis, especially when only shigellosis is suspected, our finding of only one isolate of shigella from blood cultures during a 12½-year period definitely showed the rarity of shigella bacteremia among dysentery patients. The number of shigella cultures isolated from stool specimens during this period were 571 in 1969–73 (Chong *et al.*, 1975), 468 in 1974–78 (Chong *et al.*, 1979), and over 200 in 1980–June 1981 (unpublished data).

It is known that there is no difference in the invasiveness of different species of shigella. Frequent isolation of *S. dysenteriae* from blood until 1962 was considered due to the prevalence of this species at that time (Barrette-Connor and Connor, 1970). This was supported by the fact that *S. flexneri* became a frequently isolated species and *S. sonnei* began to be isolated in 1951 (Henson, 1956). *S. boydii* was first isolated in 1969 (Barrette-Connor and Connor, 1969). Our isolate was *S. flexneri* type 2, which is currently the most frequent cause of dysentery in Korea (Chong *et al.*, 1979).

For the bacteriological diagnosis of shigella enteritis only stool culture has practical value. Three of 11 cases of shigella bacteremia reported by Scragg and Rubidge (1978) were stool culture negative. Our case was also a rare one in that the blood but not the stool culture was positive. Henson (1956) reported a case of shigellosis with positive blood and negative stool culture. The stool culture became positive on repeat test. In our case only one stool culture was done. If repeat cultures had been made there would have been possibility of a positive result.

The time of most frequent isolation of shigella

literature (Barrette-Connor and Connor, 1970). It was exceptional that Scragg and Rubidge (1978) reported 11 cases of bacteremia among

from blood is during the first few days of dysentery although in an extreme case it was positive on the 7th week (Henson, 1956). In our patient the shigella yielding blood culture was done on the 4th day of illness.

The fact that shigella bacteremia does not show toxic symptoms and is transient even without treatment suggest that the bacteria invading the blood stream from the intestine are easily removed (Winter and Harding, 1962). In our case, 2 blood samples were drawn and 4 bottles were inoculated. Among these 4 bottles only one showed a positive result indicating that the organisms were few in number and the bacteremia was transient. From the same bottle a few *K. pneumoniae* colonies were also obtained. It was impossible to tell whether it was a contaminant or an invader from ulcerated intestinal mucosa. It was clear that the organism did not play any role since the patient did not show any symptoms of septicemia. Haltalin and Nelson (1965) reported 3 cases of *Aerobacter (Enterobacter)* septicemia complicating shigellosis.

The apparently more frequent shigella isolation among fatal cases of dysentery was considered as resulting from the fact that more blood cultures were done on such patients (Barrette-Connor and Connor, 1970). However, extraintestinal shigellosis seems more frequent among patients with underlying diseases (Hallet and Scragg, 1978; Scragg, 1978). A case of osteomyelitis following bacteremia in a 23-month-old Negro girl with sickle cell anemia (Rubin *et al.*, 1968) and a case of septicemia in a 3-year-old girl with acute monocytic leukemia (Spiers, 1974) are on record. In our patient no underlying condition was noted.

Although dysentery is a self-limited infection, antimicrobial treatment may shorten the course of recovery. However, in patients with underlying diseases such as malnutrition (Scragg

and Rubidge, 1978; Hallet and Scragg, 1978), leukemia (Spiers, 1974) and in newborns (Levin, 1967; Kraybill, 1968; Moore, 1974), fatality is high despite antimicrobial therapy. Our patient received ampicillin and gentamicin and fully recovered.

## REFERENCES

- Barrette-Connor E, Connor JD: *Shigella boydii* bacteremia. *J Pediatr* 75:298, 1969
- Barrette-Connor E, Connor JD: *Extraintestinal manifestation of shigellosis*. *Am J Gastroent* 53:234, 1970
- Chong Y, Yi KN, Lee SY: *An analysis of enteropathogenic bacteria isolation—Data from Yonsei Medical Center during the years 1969 through 1973—New Med J* 18:786, 1975
- Chong Y, Song KS, Yi KN, Lee SY: *An analysis of the enteropathogenic bacteria isolation during the last five years*. *J Kor Soc Microbiol* 14:17, 1979
- Chun CH: *Historic review on enteric infections and haemorrhagic fever in Korea*. *J Kor Inf Dis* 2:27, 1970
- Dodd K, Swanson H: *Dysenteric bacteremia with a report of three cases*. *Am J Dis Child* 56:1082, 1938
- Edwards PR, Ewing WH: *Identification of Enterobacteriaceae*. 3rd ed, Burgess Pub Co, Minneapolis, 1972.
- Hallet AF, Scragg JN: *Shigella bacteremia in Africans*. *Trans R Soc Trop Med Hyg* 72:673, 1978
- Haltalin KC, Nelson JD: *Coliform septicemia complicating shigellosis in children*. *JAMA* 192:441, 1965
- Henson M: *Bacillary dysentery with bacteremia*. *Am J Med Tech* 22:179, 1956
- Kraybill EN, Controni G: *Septicemia and enterocolitis due to Shigella sonnei in a newborn infant*. *Pediatr* 42:529, 1968
- Levin SE: *Shigella septicemia in a newborn infant*. *J Pediatr* 71:917, 1967.
- Martin WJ, Washington JA Jr: *Enterobacteriaceae*. in *Manual of clinical microbiology*. 3rd ed, Editors

- Lennette EM, Balows A, Hausler WJ Jr, Truant JP, Am Soc Microbiol, Washington, 1980, p 195
- Moore EEM: *Shigella sonnei* septicemia in a neonate. *Brit Med J* 1:22, 1974
- NCCLS: *Performance standards for antimicrobial disc susceptibility test*. 2nd ed, NCCLS, Villanova, 1979
- Rubin HM, Eardly W, Nichols BL: *Shigella sonnei* osteomyelitis and sickle-cell anemia. *Am J Dis Child* 116:83, 1968
- Scragg JN, Rubidge CJ: *Shigella* infection in African and Indian children with special reference to shigella septicemia. *J Pediatr* 92:796, 1978
- Spiers ASD: *Shigella sonnei* septicemia in a child with acute monocytic leukemia. *Brit Med J* 1:456, 1974
- Whitefield C, Humphries JM: *Meningitis and septicemia due to shigella in a newborn infant*. *J Pediatr* 71:805, 1967
- Winter BV, Harding HB: *Shigella sonnei* bacteremia. *JAMA* 180:927, 1962
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