

소아 장티푸스에서 병발된 사구체 신염

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A Case of Childhood Typhoid Fever Complicated with Acute Nephritis

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Typhoid fever can cause serious complications, such as enterobrosia, meningitis, pneumonia, myocarditis, hepatitis, osteomyelitis, and disseminated intravascular coagulation in 10-15% of the patients. Kidney complications are very rare, and a few cases have been reported in children. We are reporting a case of childhood typhoid fever complicated with acute nephritis present with albuminuria, hypertension, and renal failure.

Key Words: Typhoid fever, Nephritis, Renal failure

Introduction

Salmonellosis has been one of the major invasive bacterial infections in Korea. *Salmonella typhi* (*S. typhi*) is a gram-negative aerobacillus and it transmitted mainly through consumption of contaminated water. According to a recent report by the Korea Centers for Disease Control and Prevention, the annual number of typhoid fever patients has reduced to between 100-200 cases a year in Korea¹⁾. Typhoid fever can cause serious complications, such as meningitis, pneumonia, myocarditis, hepatitis, osteomyelitis, and disseminated intravascular coagulation in 10-15% of the patients. Although renal

complications due to typhoid fever have been known to occur in 2-3% of typhoid fever patients, it is rarely found in children²⁾. We report a case of typhoid fever accompanied by acute nephritis in a 5 years old boy.

Case Report

A 5 years and 6 months Korean boy was referred to our emergency room because of a prolonged fever and abdominal pain. The patient complained of fever and abdominal pain 10 days prior to hospitalization. Although oral antibiotics were prescribed, the fever, abdominal pain and vomiting continued. The patient visited the emergency room. Muscular pain in both calves and headache were also observed. The patient did not have any specific medical history and had received full up-to-date except for the typhoid fever vaccination. It was reported that the patient frequently drinks spring water from mountains. No travel history was reported.

The vital sign showed body temperature of 40°C, heart rate of 84/min, and respiratory rate of 24/min. At

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the time of hospitalization, the patient had an acutely ill appearance and no crackling or wheezing sound was heard from his chest. His heart beat was regular but slightly fast. There was slight tenderness in the whole of the abdomen and decreased bowel sounds. There were mild splenomegaly and a few enlarged lymph nodes in both the groin and axilla. The motor grades of both legs were grade 5 and sensory abnormality was not found. The laboratory results at admission were as follows: hemoglobin was 10.9 g/dL, total WBC count was 15,510/ μ L (neutrophil 84.5%, eosinophil 0%). Inflammatory markers such as ESR and C-reactive protein (CRP) were elevated (ESR; 93 mm/hr, CRP; 13.23 mg/dL). The serum total protein was 6.8 g/dL and albumin was 3.6 g/dL. The serum BUN was 9.0 mg/dL, and serum creatinine was 0.74 mg/dL. The glomerular filtration rate was 171 mL/min/ m^2 . The urine β_2 microglobulin were increased to 26.73 mg/L. The antistreptolysin-O titer was 4.98 mg/dL, C3 was 143 mg/dL and C4 was 23.4 mg/dL.

The first Widal test was done, which showed 1:320 positive for *S. typhi* O. The abdominal CT on the third day of admission showed wall thickening of the cecum and terminal ileum, and mesenteric and left para-aortic lymphadenopathy (Fig. 1). Diffused enlargement of both kidneys was found, as well as and there were increased cortical echogenicity in the kidneys (Fig. 2). Cefotaxime (150 mg/kg/day) was started under suspicion of bacterial enteritis. Stool culture and PCR for *Yersinia* performed at

the time of admission were confirmed and reported as negative during the outpatient follow up.

On the third day of admission, the patient's fever and abdominal pain seemed to be relieved, but the blood pressure (BP) stayed above 110/60 mmHg (90th percentile). Although the BP was brought back within the normal range with antihypertensive medicine, the patient constantly complained of severe headache. A brain MRI and spinal tapping were performed but revealed no abnormalities.

On the fourth day, the blood test showed a normalized WBC count of 6,150/ μ L (neutrophil 46.3%, eosinophil 11.1%) but increased levels of serum BUN/creatinine (16.7 mg/dL and 1.55 mg/dL, respectively). The glomerular filtration rate was 92 mL/min/ m^2 . The serum sodium concentration was 137 mmol/L and serum potassium was 4.0 mmol/L. Albuminuria was found in the spot urine (urine protein/creatinine ratio 0.95), and the 24hr urine protein was 16 mg/ m^2 /hr. Serum total protein and

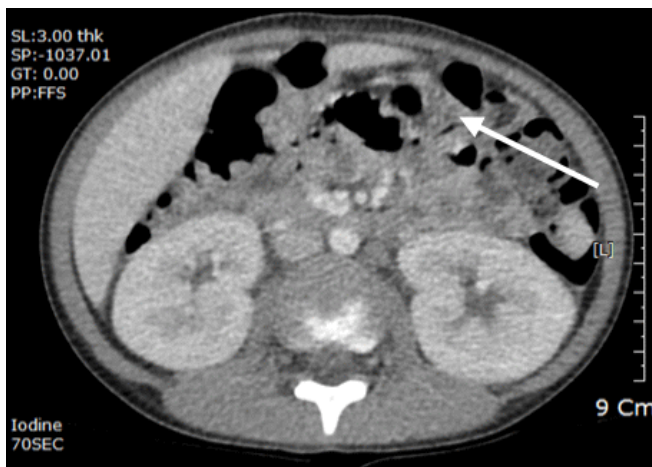


Fig. 1. Abdominal CT. Wall thickening of cecum and terminal ileum were found in abdominal CT, and mesenteric and left para-aortic lymphadenopathy were found also.

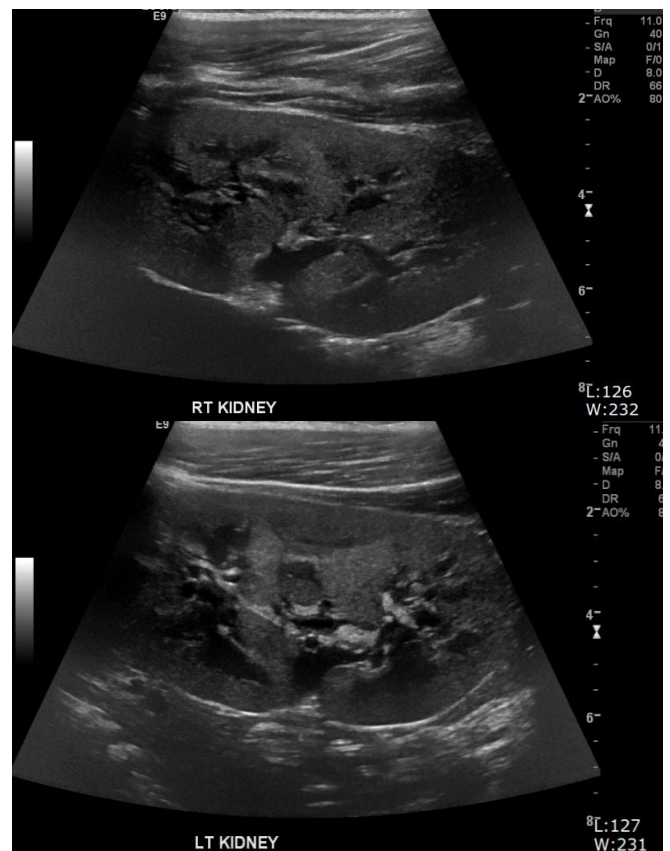


Fig. 2. Abdominal sono. Diffused enlargement was found in both kidneys and there were increased cortical echogenicity in the kidneys.

albumin were 6.2 g/dL and 3.0 g/dL. The total input/output was 950/1,010 cc, and the hourly urine output was 2.1 cc/kg/hr. Oral corticosteroids (Calcort) at a dose of 1 mg/kg/day were prescribed for 5 days under suspicion of nephritis complicated by typhoid fever. There were no abnormal findings from DMSA scan and chest X-ray.

On the fifth day, the BP was 96/60 mmHg without antihypertensive drugs.

On the seventh day of admission, the patient had no fever, a better appetite, and good urination. Serum BUN/creatinine levels decreased to 15.6 mg/dL/0.95 mg/dL, but albuminuria was still found in the spot urine (urine protein/creatinine ratio 1.14).

One week after discharge, no albuminuria was found in the urine analysis. The second Widal test was performed after a 10 day interval, which was positive for *S. typhi* O up to 1:2,560.

Discussion

S. typhi is only transmitted to humans, and it is transmitted through direct and indirect contact with an infected patient. Typhoid fever shows symptoms include a long duration of fever, gastrointestinal symptoms, and fatigue. In addition, spotted papules are found in 25% of patients. Typhoid fever complications occur when the symptoms continue for several weeks and they appear on various areas such as the central nervous system, the cardiovascular system, the respiratory system, the hepato-biliary system, the urinary system and the musculoskeletal system; however, these complications are rare, occurring in only 1-5% of children with typhoid fever²⁾.

Currently with the findings of characteristics of the causative organisms and the transmittance channels of typhoid fever, the death rate of typhoid fever patients has greatly decreased with the development of chemical treatments. However, the relapse rate is higher compared to those who have used of antibiotics, and more complications are being reported.

Salmonella infections occurs collectively or sporadically. For infants, there are reports that they can also be infected through breast milk or powdered formula^{3,4)},

and the infection rates from contaminated water and foodborne pathogens are higher. The most common sources of infection are infected poultry and meat. However, contaminated water also can be a source, as in this case⁵⁻⁷⁾.

Kidney diseases resulting from typhoid fever complications are rare, occurring in 2-3% of patients⁸⁾. Mostly reversible and temporary acute nephritis accompanied by proteinuria and hematuria can occur, and rhabdomyolysis, renal tube necrosis, and interstitial nephritis can even occur as well. According to Jassen et al., temporary renal failure can be found in 36% of *Salmonella* infected patients⁹⁾, and Manabu et al., reported a case of acute renal failure and acute nephrotic syndrome due to typhoid fever in a 45-year-old patient. The article also stated that when the kidneys of a typhoid fever patient are invaded, this can be related to IgA nephropathy, hemolytic uremic syndrome, and Henoch-Schonlein purpura¹⁰⁾.

Acute nephritis occurs due to various causes, and it is a disease which exhibits inflammation and damage of interstitium with no changes in the glomerulus and blood vessels. Acute renal failure outbreaks occur in 2-3% of acute nephritis patients, but its clinical symptoms and signs are slight, and the renal functions are usually recovered reversibly, so it is frequently overlooked¹¹⁾. The occurrence of immune complex glomerulitis with typhoid fever may be frequent, but it is often overlooked because of a lack of clinical manifestations¹²⁾. There are a few cases of typhoid fever with acute nephritis in children. In Korea, Oh, et al. verified the occurrence of acute tubulointerstitial nephritis in a child with *S. typhi* who showed fever, diarrhea, albuminuria, and oliguria by conducting a percutaneous kidney biopsy¹³⁾. A kidney biopsy was not performed in this case, because the patient's renal function recovered in a few days. Therefore, other cause of nephritis should also be considered, such as NSAID induced nephritis. However, according to literature and reports, nephritis caused by NSAID seems to take more time to revised recover from fully¹⁴⁾. In this case, it took 10 days to recover to normal renal function. Most cases of acute nephritis are recovered from spontaneously, so conservative treatments are usually sufficient. The use of

steroids as a new alternative remedy is being reported in cases of continuous renal failure after conservative treatment, but it is still controversial¹⁵⁾. In these cases, a small dose of corticosteroids was administered following conservative therapy.

We are reporting a childhood typhoid fever with acute nephritis with albuminuria, hypertension and moderate degree renal failure. As in the research conducted by Shin PJ et al., our study also showed that typhoid fever can be diagnosed by the >four fold increase of the Widal titer, even though bacteria did not grow in the blood and stool culture. Therefore, if a case has suspicious typhoid fever features, conducting an additional Widal test should be considered¹⁶⁾.

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요약

장티푸스는 10-15%에서 수막염, 폐렴, 심근염, 간염, 골수염, 파종성 혈관내 응고병증등의 심각한 합병증을 유발할수 있다. 소아에서 장티푸스 병발 후 신장에 발생하는 합병증은 국내외 모두 매우 드물다. 우리는 장티푸스 병발후 단백뇨, 고혈압, 신기능 저하가 동반된 급성 사구체 신염 케이스를 경험후 보고하는 바이다. 이 케이스는 대변 배양검사에서 병원체를 확인할 수는 없었지만 상승하는 Widal 수치로 장티푸스를 진단할 수 있었다. 장티푸스는 유병률은 감소하였지만 고열이 있는 경우 여전히 고려해보아야 하는 중요한 질환이다.