Case Report

Acute Acalculous Cholecystitis with Bacteremia Caused by *Streptococcus anginosus* Following Dental Procedure in a Previously Healthy Adolescent

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Streptococcus anginosus is a member of *Streptococcus milleri* group, and is found in the oral mucosa, respiratory tract, and gastrointestinal tract as normal flora. It can develop into a disease in patients with deteriorating clinical condition or with clinical risk factors. A previously healthy 15-year-old boy was admitted due to fever, abdominal discomfort and vomiting which lasted for 7 days. He had a history of dental procedure 1 day before the development of fever. He was diagnosed with acute acalculous cholecystitis based on the clinical, laboratory, and imaging finding, and *S. anginosus* was isolated from the blood culture. The patient was successfully treated with antibiotic therapy. **(Korean J Pediatr Infect Dis 2012;19:157-161)**

Key Words : *Streptococcus anginosus*, Cholecystitis, Bacteremia

Introduction

The *Streptococcus milleri* group (SMG) consists of three species designated *Streptococcus anginosus*, *Streptococcus constellatus*, and *Streptococcus intermedius*[1]. Although members of the SMG are found among normal oropharyngeal and gastrointestinal flora, these organisms are often associated with several types of pyogenic infections, such as dental caries, brain abscess, appendicitis and hepatic abscess, and less frequently with bacteremia and endocarditis[1-4]. Patients with serious underlying conditions, such as malignancy, diabetes mellitus and immunodeficiency were reported frequently at higher risk for infections involving SMG[4, 5]. We present a case of acute acalculous cholecystitis with bacteremia caused by *S. anginosus* in a previously healthy adolescent. To our knowledge, in Korea, this is the first report of acute acalculous cholecystitis with bacteremia caused by *S. anginosus* developed in an otherwise healthy adolescent following minor dental procedure.

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Case Report

A 15-year-old boy was admitted to our hospital with a 7-day history of fever, chills, and jaundice on 11 August, 2011. He complained of right upper quadrant abdominal discomfort with nausea for 1 week. The patient was otherwise healthy without significant medical history or medication. All immunizations were up-to-date. He had a recent travel

history of Guam with family 4 weeks ago. But other members of family were healthy without any symptoms. He had undergone scaling and an orthodontic treatment 1 day before the development of symptoms at a local dental clinic.

On admission, the patient was alert, but appeared ill. Vital signs revealed a body temperature of 40℃, blood pressure of 113/70 mmHg, pulse 90 beats per minute, and respirations 22 breaths per minute. His body weight was 54.5 kg (25-50th percentile), and his height was 172 cm (50-75th percentile). Physical examination showed jaundice in the skin, sclera of the eye, and oral mucosa with a slightly distended abdomen. He presented with tenderness of epigastric area and right upper quadrant area of the abdomen, and hepatomegaly of 2 cm below the right costal margin. Murphy's sign was positive. There were no dental caries or hidden periodontal abscesses detected on dental examination. On auscultation, regular heart beats with clear breath sounds, but slightly hypoactive bowel sounds were heard. There were no skin defects or hidden abscesses detected on dermal examination. The rest of examination was normal. Initial blood tests showed a white blood cell (WBC) count of 1,970/μL (neutrophils 59.4%, lymphocytes 36.5%, monocytes 3.6%), hemoglobin 12.1 g/dL, and a platelet count of 68,000/μL. Blood biochemical tests showed the following: aspartate aminotransferase (AST) 344 U/L, alanine aminotransferase (ALT) 139 U/L, total bilirubin 3.9 mg/dL, direct bilirubin 3.1 mg/dL, gamma-glutamyl transpeptidase (γ-GTP) 558 U/L, alkaline phosphatase (ALP) 683 U/L, lactate dehydrogenase (LDH) 10,040 U/L, blood urea nitrogen (BUN) 20.7 mg/dL, creatinine (Cr) 1.1 mg/dL, C-reactive protein (CRP) 12.09 mg/dL (normal range: <0.5 mg/dL). He had disseminated intravascular coagulopathy (DIC) with activated partial thromboplastin time (aPTT) of 45.3 seconds, D-dimer 17 mg/L, and fibrin degradation product (FDP) of 80 μg/mL. Viral hepatitis serology was performed, and the results were negative for hepatitis A virus, hepatitis B virus, hepatitis E virus, and Epstein-Barr virus. Immunological investigations including complement levels and immunoglobulin levels were normal. Intravenous cefotaxime (200 mg/kg/day divided every 8 hours) and amikacin (15 mg/kg/day divided every 12 hours) were administered after initial blood culture was obtained.

Ultrasonographic evaluation showed an increased echogenicity of hepatic parenchyma and diffuse edematous wall thickening of gallbladder (2.0-3.2 mm), but no definite nodule or mass lesion in the liver (Fig. 1). Computed tomography (CT) revealed edematous gallbladder wall thickening, pericholecystic edema, a small amount of ascites in pelvic cavity, and bilateral pleural effusion without evidence of abscess formation (Fig. 2A). Nausea and abdominal discomfort began to subside on hospital day 2, and fever disappeared on hospital day 3. Jaundice disappeared on hospital day 5, and his blood culture taken on

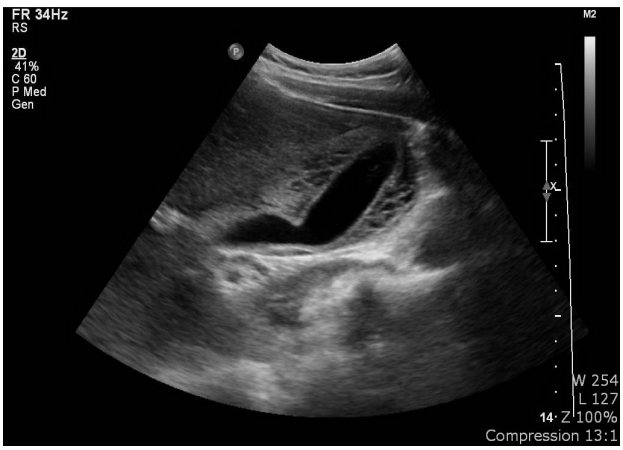

Fig. 1. Ultrasonography of the abdomen demonstrates diffuse edematous wall thickening of gallbladder.

admission from one peripheral site grew *S. anginosus* (1/1), which was sensitive to penicillin (MIC=0.12 μg/mL), erythromycin, vancomycin, cefepime, and clindamycin. Stool culture and urine culture were negative. Two-dimensional echocardiogram demonstrated normal ventricular function without any definite thrombi and vegetations. Intravenous amikacin was stopped on hospital day 6. Repeated blood cultures on hospital day 2 and 5 were negative. On hospital day 11, the patient was discharged from the hospital with hepatomegaly of 1 cm below the right costal margin. Blood tests on discharge showed a WBC count of 3,920/μL (neutrophils 35.8%, lymphocytes 48.7%, monocytes 13.5%), hemoglobin 12.4 g/dL, a platelet count of 397,000/μL, AST 24 U/L, ALT 26 U/L, total bilirubin 1.1 mg/dL, direct bilirubin 0.6 mg/dL, γ-GTP 336 U/L, ALP 269 U/L, LDH 689 U/L, BUN 11.0 mg/dL, Cr 0.8 mg/dL, and CRP 0.09 mg/dL. The patient completed 10 days of intravenous cefotaxime therapy and was given oral clindamycin (40 mg/kg/day divided every 8 hours) for 4 more days at discharge. After 4 days, he returned to the outpatient clinic, and his hepatomegaly had disappeared. A follow-up CT scan of the abdomen showed resolution of the hepatobiliary lesions (Fig. 2B).

Discussion

In this case, we diagnosed a 15-year-old boy presented with fever, abdominal discomfort, nausea, and jaundice with acute acalculous cholecystitis (AC), and the causative microorganism was identified as *S. anginosus* in the blood culture. Acute cholecystitis is uncommon in children and adolescents, and it is usually associated with biliary stones. Acute AC comprises 2-17% of acute cholecystitis in adults, whereas 30-50% in children[6]. Acute AC occurs more frequently in some clinical conditions, such as post-operative state, blunt abdominal trauma, systemic illness (Kawasaki disease, periarteritis nodosa, cystic fibrosis, leukemia, hemolytic-uremic syndrome), and infections[6-8]. The development of acute AC is associated with several risk factors, such as prolonged fasting, total parenteral nutrition, shock, intravenous narcotics, and multiple transfusions[6]. In this case, we did an abdominal ultrasonography and CT scan with a suspicion of hepatobiliary disease based on the patient's symptoms and laboratory findings, and he was diagnosed with acute AC. Because he had no history of surgery and trauma, we assumed that his AC was caused by infection.

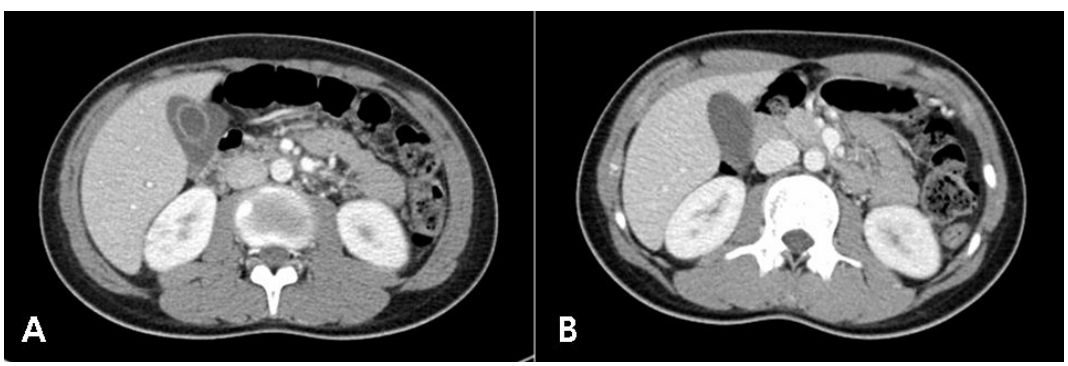

Fig. 2. Computed tomography of the abdomen. (A) Edematous gallbladder wall thickening with pericholecystic edema on admission. (B) Regression of the gallbladder lesion 1 month later.

There have been many reports on the causative microorganisms of acute AC. Some bacteria, such as *Salmonella* spp., *Escherichia coli*, *Pseudomonas* spp., *Leptospira* spp., Group A streptococcus, *Staphylococcus aureus* and *Streptococcus bovis*, and some viruses, such as Epstein-Barr virus, cytomegalovirus and hepatitis A virus can cause acute AC[8-13]. We treated him with cefotaxime and amikacin considering aforementioned bacterial pathogens. But, the blood culture revealed growth of *S. anginosus*.

Streptococcus milleri group (SMG) consists of *S. anginosus*, *S. intermedius*, and *S. constellatus*[1], and these species exist in the oral mucosa, respiratory tract, gastrointestinal tract, and female genital tract as normal flora[3]. Because SMG is not considered as skin flora, the identification in the blood sample should be considered significantly[4]. So, we thought the *S. anginosus* grown in the blood culture of this patient as a significant pathogen. Neoplasm, diabetes, hepatobiliary disease, major surgery, invasive procedure, and disruption of mechanical barrier are predisposed to SMG infection[4, 14]. Because the patient had undergone orthodontic treatment 1 day before symptoms developed, the origin of entry site might be the oral mucosa. SMG is known to have a tendency to cause pyogenic infections and abscess formation, but the three species have some differences[2]. *S. anginosus* is more likely to cause bacteremia, gastrointestinal disease and urogenital disease, but less likely to cause abscess formation than the other species of SMG[2, 4]. SMG is less likely to cause endocarditis than other viridians streptococci[4], and the echocardiogram showed normal results in our patient.

The proper treatment of acute AC has not been fully evaluated. Imamoglu et al.[7] and Tsakayannis et al.[6] reported successful results of non-operative treatment in children with acute AC, and said that initial non-operative treatment was safe and effective. In our case, *S. anginosus* was susceptible to penicillin, cefepime, vancomycin, erythromycin, and clindamycin. Based on the sensitivity results, we could use penicillin instead of cefotaxime and amikacin. However, we continued to use cefotaxime because of the probability of polymicrobial infection. Salavert et al.[4] reported that 27% of the bacteremia caused by SMG was polymicrobial, and patients with SMG bacteremia were treated with antibiotics for a mean duration of 10.8±10.3 days (range: 1-44 days). Our patient improved with cefotaxime and amikacin therapy and was discharged on hospital day 11 without any complications.

In conclusion, this is the first pediatric case of acute AC with bacteremia caused by *S. anginosus*, which is a rare disease caused by a rare pathogen. Although acute cholecystitis, especially acute AC is so rare in children and adolescents, we should consider it in a patient with typical symptoms and signs like our patient, and should perform imaging studies, such as ultrasonography or CT scan. As an initial therapy we may try an appropriate antibiotic agent in patients with acute AC while considering possible pathogens including *S. anginosus* according to the patient's history.

한 글 요 약

건강한 청소년에서의 치과 술기 후 *Streptococcus anginosus*에 의한 acute acalculous cholecystitis

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*Streptococcus anginosus*는 *Streptococcus milleri* group에 속하는 viridians streptococci의 한 종으로, 사람의 구강, 상부 호흡기, 위장관 및 여성 생식기에 정상 세균총으로 존재하며, 숙주의 면역 상태에 따라 질환을 일으킬 수 있다. 저자들은 치과 치료 후 발열, 황달, 우상복부 불편감을 주소로 내원한 건강하였던 15세 남아에서 *S. anginosus*에 의한 균혈증이 동반된 급성 무결석 쓸개염을 진단하였고, 환아는 항균제 치료 후 호전되었다. 소아 청소년 시기에 흔하지 않은 급성 무결석 쓸개염이 기저 질환 없는 청소년에서 viridians streptococci에 의해 발생한 드문 경우이다.

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