J Infect Chemother (2013) 19:1206–1209
DOI 10.1007/s10156-013-0625-6

CASE REPORT

A case of sepsis caused by *Streptococcus canis* in a dog owner: a first case report of sepsis without dog bite in Japan

Hirofumi Ohtaki · Kiyofumi Ohkusu · Hirotoshi Ohta · Takashi Miyazaki · Jun Yonetamari · Taro Usui · Ichiro Mori · Hiroyasu Ito · Tatsuo Ishizuka · Mitsuru Seishima

Received: 26 March 2013 / Accepted: 21 May 2013 / Published online: 6 June 2013

Abstract A 91-year-old dog-owning woman with a history of hypertension and femoral neck fracture consulted our hospital with fever and femur pain with redness. Laboratory test results showed leukocytosis with 85 % neutrophils and high values of C-reactive protein and procalcitonin. In addition, growth of Gram-positive streptococcus was observed in two independent blood culture sets. The isolated bacterium was identified as *Streptococcus canis* on the basis of biochemical properties and sequencing analyses of the 16S rRNA gene. The patient recovered completely without critical illness following prompt antimicrobial treatment with ceftriaxone. *S. canis*, a β-hemolytic Lancefield group G streptococcus, is in general isolated from various animal sources, but its isolation from a human clinical sample is extremely rare. Since β-hemolytic streptococci can cause severe infectious diseases such as necrotizing fasciitis, it is absolutely necessary to start antimicrobial treatment immediately. It is necessary to identify pathogenic bacteria carefully and to obtain information on a patient's background, including history of contact with an animal, when *S. canis* is isolated.

Keywords *Streptococcus canis* · β-hemolytic streptococcus · Sepsis · Zoonosis

H. Ohtaki · H. Ohta · T. Miyazaki · J. Yonetamari
Division of Clinical Laboratory, Gifu University Hospital, 1-1 Yanagido, Gifu 501-1194, Japan

H. Ohtaki · H. Ito · M. Seishima
Department of Informative Clinical Medicine, Gifu University Graduate School of Medicine, 1-1 Yanagido, Gifu 501-1194, Japan

K. Ohkusu (✉)
Department of Microbiology, Gifu University Graduate School of Medicine, 1-1 Yanagido, Gifu 501-1194, Japan
e-mail: ohkusu@gifu-u.ac.jp

T. Usui · I. Mori · T. Ishizuka
Department of General Internal Medicine, Gifu University Graduate School of Medicine, 1-1 Yanagido, Gifu 501-1194, Japan

Introduction

Infectious diseases caused by β-hemolytic streptococci are in general focused on Lancefield group A (*Streptococcus pyogenes*) and B (*Streptococcus agalactiae*). Group G streptococci are occasionally isolated. β-Hemolytic group G streptococci are mainly classified into *Streptococcus dysgalactiae* subsp. *equisimilis* and *Streptococcus canis*. In Japan, *S. dysgalactiae* subsp. *equisimilis* is frequently isolated as pathogenic bacterium from blood and abscesses of subjects with infectious diseases [1, 2], whereas only one case of *S. canis* infection has been reported in the literature [3]. The patient's history of contact with a dog is critical for the diagnosis of *S. canis* infection [4]. We, herein, report a case of sepsis caused by *S. canis*. The patient is a dog owner who has never been bitten by a dog and does not have underlying diseases such as diabetes.

Case report

On May 7th, 2012, a 91-year-old dog-owning woman with the histories of hypertension and femoral neck fracture consulted our hospital with fever (38.0 °C) and femur pain with redness. In the physical finding at the initial visit, mild cellulitis in the femur was observed, but other remarkable abnormality was not recognized. Laboratory data showed leukocytosis with 85 % neutrophils and high values of C-reactive protein and procalcitonin (Table 1). Because

these values were high for her age, the diagnosis of acute bacterial infection was made and a blood culture test was performed. For this, 10 ml of peripheral blood was injected into 92F and 93F bottles (Becton–Dickinson, Franklin Lakes, NJ, USA) and cultured using the BD BACTEC FX blood culture system (Becton–Dickinson). Bacterial growth in two independent blood culture sets was observed at 10 h after culture and the growing bacterium was confirmed as a Gram-positive streptococcus (Fig. 1a). The supernatant from the blood culture-positive sample was immediately cultured on trypticase soy agar II with 5 % sheep blood (Becton–Dickinson) at 37 °C in 5 % CO_2 atmosphere, and bacterial growth was observed at 24 h. Bacterial colonies showed white and smooth colonies with β-hemolysis (Fig. 1b). The isolated bacterium was determined as group G streptococcus by using the Prolex Streptococcal Grouping Latex Kit (Pro-Lab Diagnosis, Toronto, Canada) and identified as *S. canis* (99.9 % identical) by using Api 20 Strep (SYSMEX Biomerieux, Tokyo, Japan). In addition, amplification by polymerase chain reaction and sequencing analyses of the 16S rRNA gene were performed. Sequencing analysis was carried out using a GenBank BLAST search (National Center for Biotechnology, Bethesda, MD, USA). Sequence editing and phylogenetic analyses were performed with CLUSTAL W. The sequence of the 16S rRNA gene differed by 15 bp (1,444 bp over the entire 1,459-bp fragment, 99.0 % identical) from that of the *S. canis*-type strain ATCC 43496 (accession No. AB002483). Since bacteria with a concordance rate of the base sequence of more than 98.7 % is regarded as identical [5], the isolated bacterium was finally identified as *S. canis*.

Antimicrobial sensitivities were determined by employing the broth microdilution method using cation-adjusted Mueller–Hinton broth supplemented with 3 % horse serum (Nissui Pharmaceutical, Tokyo, Japan). The tested antimicrobial agents were penicillin G (PCG), ampicillin (ABPC), cefotaxime (CTX), ceftriaxone (CTRX), cefepime (CFPM), imipenem (IPM), erythromycin (EM), minocycline (MINO), sulfamethoxazole/

Table 1 Clinical laboratory data

Peripheral blood	
Erythrocyte	376 × 10^4 cells/μl
Hemoglobin	11.5 g/dl
Hematocrit	34.1 %
Platelet	17.5 × 10^4 cells/μl
Leukocyte	10,900 cells/μl
Neutrophil	85.0 %
Lymphocyte	8.5 %
Monocyte	6.5 %
Eosinophil	0.0 %
Basophil	0.0 %
Blood chemistry	
Total protein	6.6 g/dl
Albumin	3.6 g/dl
Creatine kinase	199 IU/l
Aspartate aminotransferase	30 IU/l
Alanine aminotransferase	21 IU/l
Lactate dehydrogenase	275 IU/l
Alkaline phosphatase	191 IU/l
Amylase	71 IU/l
Creatinine	0.88 mg/dl
Urea nitrogen	4.9 mg/dl
Sodium	133 mEq/l
Potassium	3.5 mEq/l
Chloride	99 mEq/l
Total bilirubin	0.8 mg/dl
Glucose	107 mg/dl
CRP	17.5 mg/dl
PCT	4.2 mg/dl

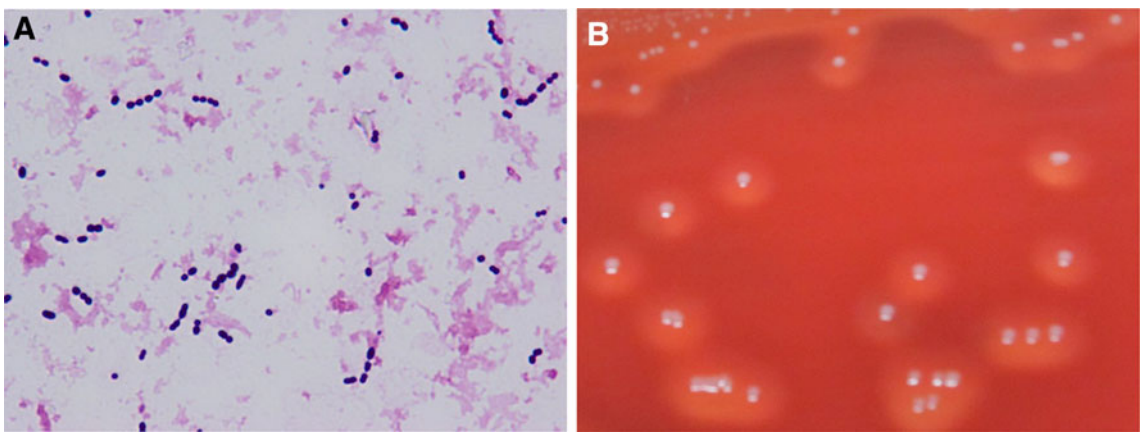

Fig. 1 Morphology of Gram staining and colony of isolated bacterium. **a** Gram-positive-streptococcus from blood culture bottle was observed (magnification ×1,000). **b** White and smooth colonies on sheep blood agar after 24-h culture at 37 °C in 5 % CO_2 atmosphere