Bacteroides pyogenes isolated from appendiceal abscess in a patient without animal contact

J. Takahashi[1], T. Sato[1], N. Kobayashi[1], M. Sado[1], M. S. Aung[2], N. Kobayashi[2] and S. Fujii[1,3]

1 Department of Medical Laboratory and Blood Center, Asahikawa Medical University Hospital, Asahikawa, Japan, 2 Department of Hygiene, Sapporo Medical University School of Medicine, Sapporo, Japan and 3 Department of Laboratory Medicine, Asahikawa Medical University, Asahikawa, Japan

Abstract

Bacteroides pyogenes is a member of the oral flora of cats and dogs. We report a case of *B. pyogenes* isolated from an appendiceal abscess in a patient without a history of animal contact. This species was identified by matrix-assisted laser desorption/ionization time-of-flight mass spectrometry (MALDI-TOF-MS) and sequencing of 16S rRNA, *rpoB*, *gyrB* and *hsp60* genes.

Keywords: 16S rRNA, appendiceal abscess, *Bacteroides pyogenes*, MALDI-TOF-MS, *rpoB*
Original Submission: 21 July 2021; **Revised Submission:** 10 August 2021; **Accepted:** 16 August 2021
Article published online: 1 September 2021

Corresponding author: S. Fujii, Department of Laboratory Medicine, Asahikawa Medical University, Hokkaido Asahikawa-shi Midorigaoka higashi Nijo 1-1-1, Asahikawa, Japan
E-mail: sfujii@asahikawa-med.ac.jp

Bacteroides pyogenes (heterotypic synonym, *B. tectum*/*B. tectus* [1]) is an obligate, anaerobic gram-negative, non-motile, non-pigment, non-spore-forming bacterium that is a member of the oral flora of cats and dogs [2,3]. Human infections with this organism are mainly due to animal bites [4]. Here, we report the first case of *B. pyogenes* isolated from the appendiceal abscess in a patient with no history of animal contact.

A 79-year-old woman visited our hospital for lateral and lower right abdominal pain. The patient had previously undergone cholecystectomy and also lobectomy for right lower lung cancer. Her underlying diseases were high blood pressure and arrhythmia. On the first day of hospital visiting, the body temperature was 36.6 °C. Appendicitis was suspected by simple computed tomography (CT), and contrast CT indicated a rupture and abscess of the appendix. Blood tests showed an elevated leukocyte count (12.9 × 10^9/L) with 82.8% neutrophils, an elevated level of C-reactive protein (CRP) (13.8 mg/dL), and procalcitonin (0.04 ng/dL). She was admitted, and treatment was initiated with antimicrobial agent Tazobactam/Piperacillin (TAZ/PIPC, 4.5 g/6 h/i.v.). A specimen of the appendiceal abscess obtained by intra-abdominal drainage was cultured under aerobic, 5% CO_2, and anaerobic conditions. After 24–48 hours of incubation, a small number of colonies of *Escherichia coli*, *Bacteroides thetaiotaomicron*, and a large number of colonies of *Peptostreptococcus micros* were observed on Trypticase Soy Agar with 5% Sheep Blood and PEA-added Anello Colombia RS Blood Agar/BBE Agar. The anaerobic condition under 0% O_2 was monitored using an anaerobic indicator. These bacteria were identified by matrix-assisted laser desorption/ionization time-of-flight mass spectrometry (MALDI-TOF-MS, Vitek MS system; bioMérieux). In addition, a large number of small, circular, smooth, and beige colonies were obtained by anaerobic culture on ABHK Agar with nalidixic acid and vancomycin (Fig. 1(a)). The Vitek MS system identified the organism as *Bacteroides pyogenes* with 99.9% confidence, and Rap ID-ANA II system (Remel. Inc) indicated *Bacteroides tectum*, while *Prevotella melaninogenica* was assigned by Vitek 2 system (bioMerieux) using an ANC card with 98% probability.

For accurate identification of the isolate (AMU202101), 16S rRNA gene sequence was determined as described previously [5]. The obtained 1395-bp sequence showed 99.86% identity to *B. pyogenes* strain JCM10003 [6]. Furthermore, the complete *rpoB*, *gyrB*, and partial *hsp60* sequences analysed for this isolate had 98.3–99.9% identity to *B. pyogenes*. These sequences of

https://doi.org/10.1016/j.nmni.2021.100933

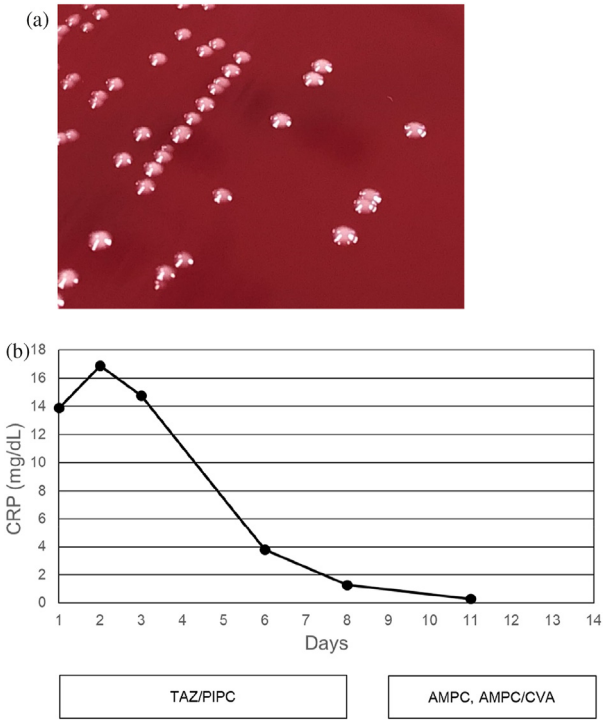

FIG. 1. (a) Colonies of *B. pyogenes* on ABHK agar (2 days after culturing). (b) CRP level of the patient (days after admission). Antimicrobials administered are shown below.

AMU202101 were deposited to GenBank under accession numbers MW930230- MW930233.

Eight days later, contrast CT showed an improvement of the appendiceal abscess and CRP level lowered (Fig. 1(b)). The antimicrobial was changed from TAZ/PIPC to Amoxicillin (AMPC, 250 mg 3 times a day) and Amoxicillin/Clavulanate (AMPC/CVA, 250SR 3 times a day). Twelve days after admission, the patient was discharged.

Human infections by *B. pyogenes* and related species have been mostly found as wound infections from dog or cat bites [4,7], and bacteremia with *B. pyogenes* resulting from a cat bite was also reported [8]. Nevertheless, there are a few reports without contact with animals for cases of joint infection [9] and bloodstream infection associated with liver abscess [10]. Similarly, in the present report, the patient had no history of evident contact with an animal, including cat, dog and cow; thus, this is probably the first case of *B. pyogenes* infection in the appendix without animal contact. Although, in our case, the transmission route of *B. pyogenes* from an animal is unclear, oral ingestion of the bacteria is possible because the infected site is the alimentary tract. Accurate identification by MALDI-TOF-MS, as well as gene sequencing, as shown in this report, is important to accumulate data to approach the real ecology of such rare pathogens, even if there is no relationship between the patient's background and the detected bacteria.

Funding

There was no funding to support this report.

Transparency declaration

None to declare.

References

[1] Sakamoto M, Suzuki N, Benno Y. *hsp60* and 16S rRNA gene sequence relationships among species of the genus *Bacteroides* with the finding that *Bacteroides suis* and *Bacteroides tectus* are heterotypic synonyms of *Bacteroides pyogenes*. Int J Syst Evol Microbiol 2010;60:2984–90.
[2] Love DN, Johnson JL, Moore LV. *Bacteroides* species from the oral cavity and oral-associated diseases of cats. Vet Microbiol 1989;19:275–81.
[3] Forsblom B, Love DN, Sarkiala-Kessel E, Jousimies-Somer H. Characterization of anaerobic, gram-negative, nonpigmented, saccharolytic rods from subgingival sites in dogs. Clin Infect Dis 1997;25(Suppl. 2):S100–6.
[4] Lau JSY, Korman TM, Yeung A, Streitberg R, Francis MJ, Graham M. *Bacteroides pyogenes* causing serious human wound infection from animal bites. Anaerobe 2016;42:172–5.
[5] Ko KS, Kuwahara T, Haehwa L, Yoon YJ, Kim BJ, Lee KH, et al. RNA polymerase beta-subunit gene (*rpoB*) sequence analysis for the identification of *Bacteroides* spp. Clin Microbiol Infect 2007;13:48–54.
[6] Sakamoto M, Ohkuma M. Identification and classification of the genus *Bacteroides* by multilocus sequence analysis. Microbiology 2011;157:3388–97.
[7] Tkadlec J, Krutova M, Matejkova J, Nyc O, Drevinek P. Bloodstream infection caused by *Bacteroides denticanum*, a close relative of *Bacteroides pyogenes*, misidentified by MALDI TOF- mass spectrometry. Anaerobe 2018;54:23–5.
[8] Madsen IR, Justesen US. Bacteremia with *Bacteroides pyogenes* after a cat bite. J Clin Microbiol 2011;49:3092–3.
[9] Gual-de-Torrella A, Suárez-Barrenechea AI, Del Toro MD. *Peptostreptococcus canis* and *Bacteroides pyogenes* prosthetic joint infection. Enferm Infecc Microbiol Clin 2019;37:347–8.
[10] Park JE, Park SY, Song DJ, Huh HJ, Ki CS, Peck KR, et al. A case of *Bacteroides pyogenes* bacteremia secondary to liver abscess. Anaerobe 2016;42:78–80.