Bloodstream Infection Due to Mycoplasma arginini in an Immunocompromised Patient

Mayumi Watanabe,a Shigemi Hitomi,b Miki Goto,a and Yuichi Hasegawac
Department of Clinical Laboratories,a Department of Infectious Diseases,b and Department of Hematology,c Tsukuba University Hospital, Tsukuba, Japan

Mycoplasma arginini, an organism usually recovered from mammals, was isolated from the blood of a febrile patient with advanced non-Hodgkin lymphoma. The patient’s condition improved without administration of antimycoplasmal drugs. Simulation of blood culture showed that automated blood culture instruments may fail to detect the organism.

CASE REPORT

A 59-year-old Japanese man was hospitalized because of general arthralgia, appetite loss, and pyrexia lasting for approximately 1 week. He had been suffering from non-Hodgkin lymphoma for 12 years, which had never remitted in spite of multiple courses of chemotherapy with various regimens. In the previous 2 months, granulocyte colony-stimulating factors and intravenous human immune globulin were repeatedly given for treatment of persistent neutropenia and hypogammaglobulinemia, respectively. He had close contacts with several cats kept in his house.

On admission, the patient showed a body temperature of 38.3°C, enlargement of multiple superficial lymph nodes, and tumefaction of multiple joints, including wrists, fingers, elbows, knees, and ankles. Blood tests revealed anemia (6.8 g/dl), hypoalbuminemia (2.3 g/dl), hypernatremia (157 meq/liter), hyperchloremia (120 meq/liter), and elevations of serum transaminases (aspartate aminotransferase [107 U/liter], alanine aminotransferase [72 meq/liter]), and of creatinine (1.18 mg/dl). Chest X-ray and urinalysis did not reveal abnormal findings. Treatments with cefazolin did not abate his complaints, which subsided after the antibiotic was changed to ceftriaxone and administration of human immune globulin (2.5 g/day for 3 days) was initiated on day 9. The antimicrobial therapy was supplemented with intravenous minocycline (200 mg/day) on day 17 because pyrexia recurred temporally and, subsequently, switched from the combination to oral doxycycline (100 mg/day) on day 29. The patient received another course of chemotherapy for lymphoma and was discharged on day 46. Doxycycline was given until day 57 (Fig. 1).

All of the blood drawn from the patient was inoculated into BacT/Alert SA and SN bottles (Sysmex bioMérieux, Tokyo, Japan) and incubated with the BacT/Alert 3D system (Sysmex bioMérieux). Among two sets of blood cultures obtained at hospitalization, one SN bottle for anaerobic culture showed a positive growth signal after 4 days of incubation. Although Gram staining of broth in the bottle did not yield visible signs of any organism, subculture on Anaero Columbia agar with rabbit blood (Nihon Becton, Dickinson) after incubation for 3 days under 5% CO2 at 35°C. The remaining three bottles did not yield positive signals even after 7 days of incubation in the instrument, but subculture of broth in the bottles on agar plates showed growth of colonies with a similar appearance. A DNA sequence of the 16S rRNA gene of the organism (1,432 bp) (9) was 99.8% identical to that of Mycoplasma arginini G230T registered in GenBank. No organism was recovered from the blood drawn on days 8, 16, and 23, even after subculture of broth for 7 days on anaerobic Columbia agar with rabbit blood anaerobically and 5% sheep blood agar under 5% CO2. The synovial fluid obtained from the right ankle on day 3 was clear and negative for crystals and culture in routine bacterial examinations.

The drug susceptibility of the isolated M. arginini strain was assayed with the Epsilometer test (AB Biodisk, Solna, Sweden) on PPLO agar. The organism was inoculated by means of cotton swabs, which were dipped in saline containing approximately 107 CFU of organisms per ml and gently squeezed to remove excess fluid. Intersections of colonial growth and test strips were confirmed microscopically after anaerobic incubation at 35°C for 4 days. MICs of ceftriaxone, clindamycin, clarithromycin, doxycycline, ciprofloxacin, and sparfloxacin were >32 μg/ml, 0.047 μg/ml, >256 μg/ml, 0.047 μg/ml, >32 μg/ml, and >32 μg/ml, respectively. For a simulation of blood culture, 3 × 104 CFU of organisms and 5 ml of blood from a healthy volunteer were inoculated into BacT/Alert SA and SN bottles and Bactec Plus Aerobic/F and Anaerobic/F culture vials (Nihon Becton, Dickinson). The synovial fluid obtained from the right ankle on day 3 was clear and negative for crystals and culture in routine bacterial examinations.

Since its first description in 1968 (2), M. arginini has been...
recovered from tissues and secretions of various mammals (1–7, 10, 15–19). In humans, however, only three cases of M. arginini isolation, namely, a fatal disseminated infection occurring in a slaughterhouse worker with advanced non-Hodgkin lymphoma (21), an open femur fracture and deep infection resulting from an African lion attack (11), and disseminated infection occurring in a former bodybuilder having used locally distributed drugs and supplements derived from animal materials of uncontrolled sources (14), have been reported. All of these patients had an apparent history or possibility of exposure to a wild animal or animal products, suggesting that human M. arginini infection is zoonotic. In the present case, the patient had daily contact with domestic cats in his house. Previous studies showed that 5 to 20% of examined cats possess the organism, which was recovered mostly from the oropharyngeal regions (16–18). Therefore, we speculate that some of the domestic cats carried M. arginini in their oropharyngeal regions, which was excreted into respiratory secretions and transmitted to the patient.

The infectivity of M. arginini has been considered very low in immunocompetent humans, as shown by the results of a serological study in which the sera obtained from 22 patients with an apparent history or possibility of exposure to a wild animal or animal products, suggesting that human M. arginini infection is zoonotic. In the present case, the patient had daily contact with domestic cats in his house. Previous studies showed that 5 to 20% of examined cats possess the organism, which was recovered mostly from the oropharyngeal regions (16–18). Therefore, we speculate that some of the domestic cats carried M. arginini in their oropharyngeal regions, which was excreted into respiratory secretions and transmitted to the patient.

To date, appropriate treatments for M. arginini infection remain undetermined due to rare instances of the disease. In the present case, although the patient recovered promptly after administration of human immune globulin in addition to ceftriaxone, the organism had become undetectable in the blood prior to the treatment, implying that the disseminated infection was cured spontaneously regardless of the medication. In other cases, M. arginini infections were treated with long-term administration of antimycoplasmal drugs, including macrolides and tetracyclines (11, 14). Although antimycoplasmal drugs were also administered in the present case, they may have had minimal, if any, influence on the clinical course because they were not given until day 17 of hospitalization, when the patient’s complaints had almost resolved.

Although all of the blood culture bottles submitted at hospitalization and used in the simulation experiment contained viable M. arginini organisms, none yielded positive signals except for one SN bottle submitted at hospitalization. This finding indicates that automated blood culture instruments may fail to detect M. arginini in the blood. Previous studies demonstrated that sodium polyanethol sulfonate, an anticoagulant supplement in blood culture bottles, may inhibit the growth of Mycoplasma hominis (8, 20). In addition, investigators mentioned another possibility, namely, that the amount of CO2 produced by the organism is insufficient for its growth to be detected with the BacT/Alert system (20). We consider the possibility that similar mechanisms may have caused the failure in detecting the growth of M. arginini. The reason why only one SN bottle yielded a positive growth signal is unknown. Therefore, until the sensitivity of automated blood culture instruments is improved, terminal subculture on appropriate broth or media supporting the growth of Mycoplasma species should be considered when the blood for microbiological examination is obtained from a patient with a risk of zoonotic mycoplasmal infection.

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REFERENCES