Letter to the Editor
Clinical Microbiology

Ann Lab Med 2018;38:607-609
https://doi.org/10.3343/alm.2018.38.6.607
ISSN 2234-3806 • eISSN 2234-3814

ANNALS OF LABORATORY MEDICINE

The First Case of Chronic Otitis Media due to *Kerstersia gyiorum* in Korea

Jin-Hong Kim, M.D., Eunyoung Lee, B.S., and Yangsoon Lee, M.D., Ph.D.
Department of Laboratory Medicine, Hanyang University Seoul Hospital, Hanyang University College of Medicine, Seoul, Korea

Dear Editor,

Kerstersia gyiorum is a pathogen that is infrequently reported in humans [1]. This bacterium, first classified in 2003, is a gram-negative coccobacillus belonging to the family *Alcaligenaceae*, which is isolated from water, soil, animal, and human specimens [2, 3]. Although some cases of *K. gyiorum* infection have been reported worldwide [4-8], none to date have been reported in Korea. We report the first case of chronic otitis media (COM) due to *K. gyiorum* infection in Korea.

A 51-year-old female patient visited the otolaryngology department of Hanyang University Seoul Hospital with otorrhea in the left ear, which had started several weeks earlier. At the age of 25 and 28 years, she underwent canal wall-down mastoidectomies type III tympanoplasty of the right and left ears, respectively. On the day of admission, ear endoscopy revealed a purulent discharge and crust in the left external ear canal; therefore, the patient received crust removal and cefpodoxime treatment.

A swab specimen was taken from the patient's ear discharge and analyzed by bacterial culture and Gram staining. Gram staining revealed gram-negative coccobacilli in singles, pairs, and short chains (Fig. 1A). The specimen was inoculated on 5% sheep blood agar and MacConkey agar. After 24 hours, colonies of the organism grew on both sheep blood agar and MacConkey agar at 35°C under 5% CO_2 (Fig. 1B and 1C). The colonies were gray and displayed spreading edges; colony isolates were oxidase negative and catalase positive. Isolates were examined using the MicroScan Walkaway (Beckman Coulter, Brea, CA, USA) and VITEK 2 (bioMérieux, Marcy-l'Etoile, France) automated bacterial identification systems; however, both analyses failed to identify the bacterial species. The species was identified as *K. gyiorum* by matrix-assisted laser desorption/ionization-time of flight mass spectrometry (MALDI-TOF MS) with a MALDI Biotyper using MALDI-Biotyper software (version 2.3, Bruker Daltonics, Bremen, Germany). 16S ribosomal RNA gene sequencing was performed using primers 27F (5′-AGAGTTTGATCCTGGCTCAG-3′) and 1492R (5′-GGTTACCTTGTTACGACTT-3′) as described previously [1]. We obtained a consensus sequence of 1,394 bp, which was 99.9% identical to *K. gyiorum* LMG 5906 (GenBank accession number AY131213). The next-nearest match was *K. similis* LMG 5890 (GenBank accession number AY131212), with 99.4% homology. In addition, *gyrB* gene sequencing was performed as described previously [4]. The *gyrB* gene sequence was 98.6% and 96.9% identical to *K. gyiorum* LMG 5906 (GenBank accession number HE585644) and *K. similis* LMG 5890 (GenBank accession number HE585647), respectively.

The results of the antimicrobial susceptibility test performed with the MicroScan Walkaway system were assessed according to the Clinical and Laboratory Standards Institute (CLSI) minimum inhibitory concentration (MIC) standards for other non-

Received: December 5, 2017
Revision received: March 13, 2018
Accepted: June 19, 2018

Corresponding author: Yangsoon Lee
https://orcid.org/0000-0003-3821-3741
Department of Laboratory Medicine, Hanyang University Seoul Hospital, Hanyang University College of Medicine, 222-1 Wangsimni-ro, Seongdong-gu, Seoul 04763, Korea
Tel: +82-2-2290-9655, Fax: +82-2-2290-9193
E-mail: yangsoon@hanyang.ac.kr

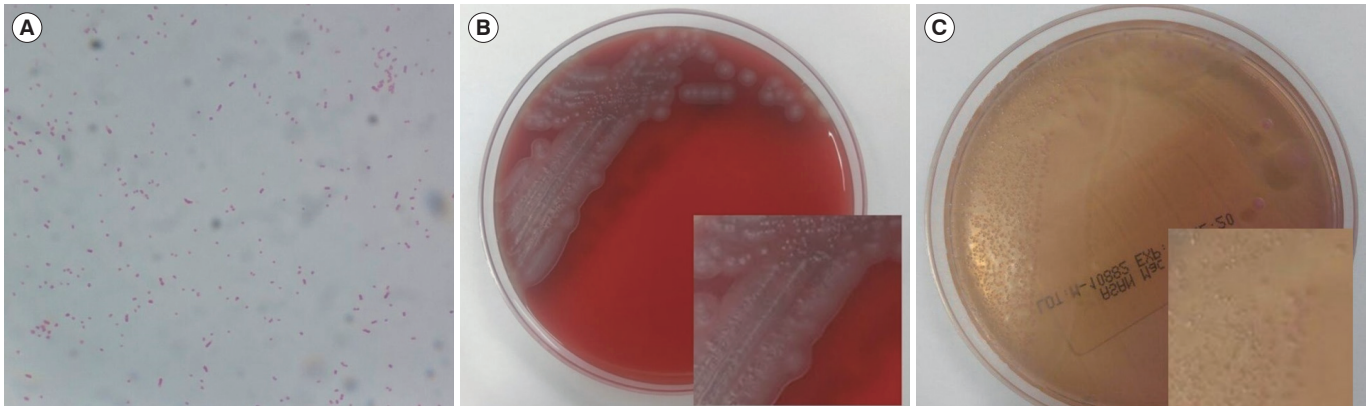

Fig. 1. Microscopic and colony morphology of *Kerstersia gyiorum*. (A) Gram-negative coccobacilli on a Gram-stained smear (×1,000). (B) Gray colonies with spreading edges on 5% sheep blood agar after 24-hour incubation. (C) *K. gyiorum* obtained from the patient's specimen on MacConkey agar.

Table 1. Summary of *Kerstersia gyiorum* cases related to chronic otitis media

Reference	Patient	Diagnosis (past history)	Sampling location	Co-infections	Antibiotic treatment	Antibiotic susceptibilities	Identification method
Present study	51/F	Chronic ear disease (s/p canal wall-down mastoidectomy, both, approximately 2 yr ago)	Left external auditory meatus	Diphtheroid	Oral cefpodoxime and cefcapene	Susceptible to amikacin, aztreonam, cefepime, cefotaxime, ceftazidime, gentamicin, imipenem, levofloxacin, meropenem, piperacillin-tazobactam, piperacillin, ticarcillin-clavulanate, tobramycin, and trimethoprim-sulfamethoxazole and resistant to ciprofloxacin	MALDI-TOF MS, confirmed by 16S rRNA gene sequencing
Almuzara *et al* (2012) [4]	16/M	Complicated cholesteatomatous chronic otitis media with left peripheral facial palsy grade IV (Left otitis media at age 12 and retroauricular abscess)	Bezold's abscess	None	Intravascular ampicillin-sulbactam and ceftriaxone/oral ciprofloxacin and amoxicillin-clavulanic acid	Susceptible to amoxicillin, ceftriaxone, ceftazidime, cefepime, trimethoprim-sulfamethoxazole, ciprofloxacin, and levofloxacin	16S rRNA gene sequencing
Pence *et al* (2013) [6]	55/M	Chronic ear disease (s/p canal wall-down mastoidectomy, both, approximately 40 yr ago)	Left mastoid cavity	*Corynebacterium amycolatum*	Trimethoprim-sulfamethoxazole	Susceptible to cefepime, piperacillin-tazobactam, Trimethoprim-sulfamethoxazole, and gentamicin and resistant to ciprofloxacin	MALDI-TOF MS, confirmed by 16S rRNA gene sequencing
Mwalutende *et al* (2014) [5]	53/M	Chronic suppurative otitis media	Left external auditory meatus	*Proteus mirabilis*	Ciprofloxacin ear drops	Susceptible to piperacillin, cefotaxime, ceftazidime, gentamicin, imipenem, meropenem, and moxifloxacin and partially susceptible to ciprofloxacin	MALDI-TOF MS
Mwalutende *et al* (2014) [5]	33/M	Chronic suppurative otitis media	Right external auditory meatus	*Staphylococcus aureus*, *Escherichia coli*	Ciprofloxacin ear drops	Susceptible to piperacillin, cefotaxime, ceftazidime, gentamicin, imipenem, meropenem, and moxifloxacin and partially susceptible to ciprofloxacin	MALDI-TOF MS
Uysal *et al* (2015) [7]	25/M	Chronic suppurative otitis media	Right external auditory meatus	*Pseudomonas aeruginosa*	Intravascular imipenem	Susceptible to amikacin, cefepime, ceftazidime, colistin, imipenem, meropenem, and piperacillin-tazobactam, intermediate to levofloxacin, and ticarcillin-clavulanate and resistant to aztreonam, ciprofloxacin, and trimethoprim-sulfamethoxazole	MALDI-TOF MS, confirmed by 16S rRNA gene sequencing

Abbreviations: F, female; M, male; MALDI-TOF MS, matrix-assisted laser desorption ionization-time of flight mass spectrometry.

https://doi.org/10.3343/alm.2018.38.6.607

Enterobacteriaceae [9]. The isolate was susceptible to amikacin (MIC ≤16 μg/mL), aztreonam (≤4 μg/mL), cefepime (≤2 μg/mL), cefotaxime (≤1 μg/mL), ceftazidime (≤1 μg/mL), gentamicin (≤4 μg/mL), imipenem (≤1 μg/mL), levofloxacin (≤2 μg/mL), meropenem (≤1 μg/mL), piperacillin-tazobactam (≤16 μg/mL), piperacillin (≤16 μg/mL), ticarcillin-clavulanate (≤16 μg/mL), tobramycin (≤4 μg/mL), and trimethoprim-sulfamethoxazole (≤2/38 μg/mL) and was resistant to ciprofloxacin (>2 μg/mL).

A week after the initial visit, the antibiotic administered was changed to cefcapene and continued for six days; four weeks later, the patient's ear discharge symptoms were resolved with no other complications.

K. gyiorum has been isolated from patients with various diseases [1]. A total of 10 cases of patients infected with *K. gyiorum* have been recorded, five of which were associated with COM; the features of these cases are shown in Table 1 [4-7]. Four of the five patients showed co-infection, which is a common feature of COM [10]; likewise, a diphtheroid was isolated from our patient with *K. gyiorum* who developed an infection at the site of operation approximately 25 years after undergoing surgery for COM.

It is difficult to distinguish *K. gyiorum* from other microorganisms using biochemical methods as it has characteristics similar to those of other microorganisms [4]. Additionally, *K. gyiorum* is not accurately identified by automated bacterial identification methods such as MicroScan Walkaway, Vitek 2, API 20 NE (bioMérieux), and the RapID NF plus assay (Thermo Fisher Scientific, Lenexa, KS, USA) [4-8]. MALDI-TOF MS, which has recently been widely used in clinical laboratories, identified *K. gyiorum*, both in our case and in previously reported cases [5-8]. Therefore, MALDI-TOF MS should be used when bacterial species identification is difficult using conventional methods. In addition, the clinician and laboratory should consider the possibility of *K. gyiorum* infection and the use of MALDI-TOF MS when inaccurate identification of pathogen is suspected in patients with COM.

Authors' Disclosures of Potential Conflicts of Interest

No potential conflicts of interest relevant to this article are reported.

REFERENCES

1. Baran I, Düzqün AP, Mumcuo ğlu I, Aksu N. Chronic lower extremity wound infection due to *Kerstersia gyiorum* in a patient with Buerger's disease: a case report. BMC Infect Dis 2017;17:608.
2. Coenye T, Vancanneyt M, Cnockaert MC, Falsen E, Swings J, Vandamme P. *Kerstersia gyiorum* gen. nov., sp. nov., a novel *Alcaligenes faecalis*-like organism isolated from human clinical samples, and reclassification of *Alcaligenes denitrificans* Ruger and Tan 1983 as *Achromobacter denitrificans* comb. nov. Int J Syst Evol Microbiol 2003;53:1825-31.
3. Austin B. The family *Alcaligenaceae*. In: Rosenberg E, DeLong EF, et al., eds. The prokaryotes: alphaproteobacteria and betaproteobacteria. Berlin, Heidelberg: Springer Berlin Heidelberg, 2014:753-54.
4. Almuzara MN, Barberis CM, Traglia GM, Ordoñez AM, Famiglietti AM, Ramirez MS, et al. Isolation of *Kerstersia gyiorum* from a patient with cholesteatomatous chronic otitis media. J Clin Microbiol 2012;50:3809-11.
5. Mwalutende A, Mshana SE, Mirambo MM, Mushi MF, Chalya PL, Giliyoma JM, et al. Two cases of chronic suppurative otitis media caused by *Kerstersia gyiorum* in Tanzania: is it an underappreciated pathogen in chronic otitis media? Int J Infect Dis 2014;29:251-3.
6. Pence MA, Sharon J, McElvania Tekippe E, Pakalniskis BL, Ford BA, Burnham CA. Two cases of *Kerstersia gyiorum* isolated from sites of chronic infection. J Clin Microbiol 2013;51:2001-4.
7. Uysal EB, Çelik C, Tuzcu N, Can F, Doğan M, Ertürk R, et al. A case of chronic suppurative otitis media caused by *Kerstersia gyiorum*. APMIS 2015;123:986-9.
8. Ogawa Y, Lee ST, Kasahara K, Koizumi A, Chihara Y, Nakano R, et al. A first case of isolation of *Kerstersia gyiorum* from urinary tract. J Infect Chemother 2016;22:265-7.
9. CLSI. Performance standards for antimicrobial susceptibility testing. 27th ed, CLSI supplement M100S. Wayne, PA: Clinical and Laboratory Standards Institute; 2017.
10. Vartiainen E and Vartiainen J. Effect of aerobic bacteriology on the clinical presentation and treatment results of chronic suppurative otitis media. J Laryngol Otol 1996;110:315-8.