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말초삽입 중심정맥관에서 채취한 혈액에서 동정된 *Chryseobacterium hominis* 1례 보고

A Case of *Chryseobacterium hominis* Isolated from Human Blood Drawn Through Peripherally Inserted Central Catheter

원동주[1,2] · 변정현[1,2,3] · 김명숙[1,2] · 용동은[1,2]
Dongju Won, M.D.[1,2], Jung-Hyun Byun, M.D.[1,2,3], Myungsook Kim, Ph.D.[1,2], Dongeun Yong, M.D.[1,2]

연세대학교 의과대학 진단검사의학과[1], 세균내성연구소[2], 경상대학교 의과대학 경상대학교병원 진단검사의학과[3]
Department of Laboratory Medicine[1] and Research Institute of Bacterial Resistance[2], Yonsei University College of Medicine, Seoul; Department of Laboratory Medicine[3], Gyeongsang National University Hospital, Gyeongsang National University College of Medicine, Jinju, Korea

Chryseobacterium hominis is non-fermenting Gram-negative rod that was first identified as a novel species in 2007. Here, we report the first clinical case of *C. hominis* bacteremia, which was confirmed by MALDI-TOF MS and 16S rRNA gene sequencing. A 16-year-old boy diagnosed with acute lymphoblastic leukemia was hospitalized for three months. Two sets of blood culture test through a peripherally inserted central catheter (PICC), which was inserted a month ago, was performed when his white blood cell count declined and he had a high fever. Colonies of medium sizes that looked round, mucoid, sticky, and grayish on blood and chocolate agar plates were observed. Identification of bacteria using the VITEK MALDI-TOF MS system (BioMérieux, France) was not successful and the VITEK 2 system (BioMérieux, USA) indicated *Sphingomonas paucimobilis*, with a questionable level of confidence (92%). However, Microflex LT Biotyper (Bruker Daltonics, Germany) showed *C. homins* (log score: 1.81) and sequence of 16S rRNA showed a 100% identity with *C. hominis*. Piperacillin-tazobactam was administered since the isolate was susceptible to piperacillin-tazobactam but *C. hominis* showed growth in the next four follow-up culture of blood drawn through PICC. The fever subsided only after PICC was changed. The clinical prognosis and antimicrobial susceptibility test of *C. hominis* should be further studied.

Key Words: *Chryseobacterium*, *Chryseobacterium hominis*, Catheter-related blood stream infection, Bacteremia

INTRODUCTION

Chryseobacterium hominis is an aerobic, non-motile, and non-fermenting gram-negative rod-shaped bacterium. *C. hominis* was first identified as a novel species in 2007 through clinical isolates biochemically similar to CDC groups II-h and II-c [1]. Here, we report the first clinical case of *C. hominis* bacteremia, which was confirmed by MALDI-TOF MS and 16S rRNA gene sequencing. This study was approved by the Institutional Review Board for Human Research, Yonsei University, Severance Hospital (4-2018-0685).

Corresponding author: Jung-Hyun Byun, M.D.
https://orcid.org/0000-0001-5909-5807
Department of Laboratory Medicine, Gyeongsang National University Hospital, Gyeongsang National University College of Medicine, 79 Gangnam-ro, Jinju 52727, Korea
Tel: +82-55-750-8612, Fax: +82-55-762-2696
E-mail: MICROBYUN@gmail.com; JHBYUN@gnuh.co.kr

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CASE

A 16-year-old boy diagnosed with acute lymphoblastic leukemia (ALL) six years ago was hospitalized for three months for conservative treatment. Suddenly, his white blood cell count showed a decline from a normal level to 2.20×10^9/L (neutrophils, 74.7%), at which time the patient's body temperature was 36.9–37.1℃. A few days later, the white blood cell count further decreased

to 1.28×10^9/L (neutrophils, 71.9%), and the patient had a high fever over 38℃. *Stenotrophomonas maltophilia* was isolated from blood drawn by a peripherally inserted central catheter (PICC), which was implanted into the patient one month ago. Empirically, levofloxacin and piperacillin/tazobactam had been administered daily and trimethoprim/sulfamethoxazole had been administered for two days based on a chemotherapy regimen. *S. maltophilia* disappeared from the follow-up blood cultures after meropenem was administered instead of piperacillin/tazobactam. However, other medium-sized colonies that appeared round, mucoid, sticky, and grayish on a blood agar plate were observed in one of the two sets of blood culture samples. No observed growth on MacConkey agar led us to presume that bacteria were gram-positive. However, colonies of gram-negative bacilli that were catalase, oxidase, and indole positive were subsequently identified. Species identification using the VITEK MALDI-TOF MS system (BioMérieux, Marcy l'Etoile, France) was not successful; the VITEK 2 system (BioMérieux, Durham, NC, USA) indicated *Sphingomonas paucimobilis*, with a questionable level of confidence (92%). Microflex LT Biotyper (Bruker Daltonics, Leipzig, Germany) showed *C. hominis* (log score: 1.81). For confirmation, 721 base pairs of the 16S rRNA gene were sequenced, and the ezTaxon database (http://www. ezbiocloud.net/eztaxon) showed a 100% identity with *C. hominis* and a 97.46% identity with *C. hagamense*.

Antimicrobial susceptibility testing was performed using the VITEK 2 system AST-N225 card. According to the interpretive criteria of the Clinical and Laboratory Standards Institute M100, 27th ed. for non-*Enterobacteriaceae* [2], this isolate was susceptible to ciprofloxacin, minocycline, piperacillin, piperacillin-tazobactam, and trimethoprim-sulfamethoxazole, but resistant to meropenem (Table 1). It was susceptible to trimethoprim-sulfamethoxazole, but the drug failed at microbiological eradication. One of the reasons may be that trimethoprim-sulfamethoxazole was administered only for two days. As meropenem was administered instead of piperacillin-tazobactam, *C. hominis* showed growth in the next four follow-up culture of blood drawn through PICC. After replacing the patient's PICC, the culture tests of blood collected from venipuncture and the newly inserted PICC were all negative. His fever subsided shortly afterwards, and it took two weeks for the white blood cell count to reach normal levels. Finally, he was discharged three weeks later.

Table 1. Antimicrobial susceptibility of *Chryseobacterium hominis* isolated from the patient's blood culture

Antimicrobial agent	MIC (μg/mL)	Interpretation
Ciprofloxacin	≤0.25	S
Minocycline	≤1	S
Piperacillin	≤4	S
Piperacillin/tazobactam	≤4	S
Trimethoprim/sulfamethoxazole	≤20	S
Meropenem	≥16	R

Abbreviations: MIC, minimum inhibitory concentration; R, resistant; S, susceptible.

DISCUSSION

As there have been no clinical reports on *C. hominis* since it was listed as a novel species in 2007, its clinical significance has not been clearly established. However, some researchers have previously reported that *Chryseobacterium* spp. mainly infects newborns and immunocompromised hosts from all age groups [3, 4]. In this case, *C. hominis* was repeatedly isolated from four blood samples drawn by PICC in a neutropenic ALL patient undergoing chemotherapy that included the administration of meropenem, to which the isolate was resistant. Although levofloxacin was administered daily, this isolate that is susceptible to ciprofloxacin was recovered repeatedly. Furthermore, the drug susceptibility study on *Chryseobacterium* spp. isolates reported that the most active antimicrobials were the newer quinolones, including levofloxacin [5]. In this case, *C. hominis* was an opportunistic pathogen causing a catheter-related blood stream infection, and its microbiological eradication was achieved after the PICC was removed.

In conclusion, we report a catheter-related blood stream infection case of *C. hominis* in an ALL patient. The identification of *C. hominis* by biochemical testing has limitations; however, it was readily identified and confirmed using MALDI-TOF MS and 16S rRNA sequencing in this study. The clinical prognosis and antimicrobial susceptibility testing of *C. hominis* should be further studied.

요 약

*Chryseobacterium hominis*는 2007년에 새로운 종으로 등재된 비발효성 그람음성 막대균이다. 우리는 MALDI-TOF MS와 16S rRNA 유전자 염기서열 분석으로 확인된 *C. hominis* 패혈증의 첫 임상적 증례를 보고한다. 급성림프구성백혈병으로 진단받았던 16

세의 남자 환아가 3달 동안 병원에 입원 중이었다. 입원 도중 환아의 백혈구 수치가 감소하고 열이 나기 시작하여 한 달 전 삽입했던 말초삽입 중심정맥관을 통하여 혈액을 채취하였고 혈액 배양을 시행하였다. 혈액배지와 초콜릿배지에서 중간 크기의 동그랗고 점액성의 끈적한 회색의 집락들이 관찰되었다. VITEK MALDI-TOF와 VITEK 2에서는 동정이 잘 안 되었지만, Microflex LT Biotyper는 log score 1.81로 *C. hominis*를 보여주었고 16s rRNA 유전자 염기서열 분석은 *C. hominis*와 100.0% 일치도를 보여주었다. 환자는 감수성인 Piperacillin-tazobactam을 사용하였지만 추적 혈액 배양 검사에서 지속적으로 *C. hominis*가 동정되었다. 환자는 결국 말초삽입 중심정맥관을 제거하고 나서야 열이 감소하며 회복되었다. *C. hominis*의 임상적 예후와 항생제 감수성 결과는 더욱 연구될 필요가 있다.

AUTHORS' DISCLOSURES OF POTENTIAL CONFLICTS OF INTEREST

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

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