

복강 내 농양을 가진 노인 환자에서 발생한 *Eggerthella lenta* 균혈증

Bacteremia Caused by *Eggerthella lenta* in an Elderly Patient with an Intra-abdominal Abscess

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Eggerthella lenta is an anaerobic, non-spore-forming, non-motile, gram-positive bacillus that can be isolated from human feces and a few other clinical specimens. Bacteremia caused by the organism is rare but, when present, is always of clinical significance. *E. lenta* is an emerging pathogen that has been under-recognized because of difficulties with its laboratory identification. Few reports on *E. lenta* infections and the optimal treatment thereof are available. We describe a case of bacteremia caused by *E. lenta* in an elderly patient with an intra-abdominal abscess. We also review the current literature.

Key Words: *Eggerthella lenta*, Bacteremia, Identification

INTRODUCTION

Eggerthella lenta is part of the normal human intestinal flora and has been most commonly associated with infections arising from the gastrointestinal tract [1]. Predisposing conditions include gastrointestinal tract disease, malignancies, hepatobiliary disease, immobilization, bedsores, diabetes mellitus, and stroke [2-4]. *E. lenta* is an emerging pathogen that has been under-recognized because of difficulties with its laboratory identification [3]. Few reports have addressed *E. lenta* infections or optimal treatments

thereof. Here, we describe one case that we treated and briefly summarize the available data on *E. lenta* bacteremia.

CASE REPORT

A 73-yr-old male presented with fever, vomiting, and dyspnea. His medical history included a prior cerebrovascular attack and multiple complications caused by hemiplegia, including recurrent urinary tract infections and pressure sores requiring continuous medical care.

On the day of admission, his body temperature, pulse rate, respiratory rate, and blood pressure were 40.4°C, 108/min, 39/min, and 170/90 mmHg, respectively. Abdominal examination revealed diffuse tenderness and guarding with absence of bowel sounds. The initial laboratory test data were as follows: Hb, 14.9 g/dL; white blood cell count, 7,250/μL (neutrophils, 78.0%); and platelets, 110,000/μL. His procalcitonin level was elevated to 28.46 ng/mL. Sputum and urine cultures were negative. PCR to detect *Mycobacterium tuberculosis* was negative. Abdominal and pelvic contrast computed tomography scans were suggestive of an

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abdominal abscess; air appeared to be present at the junction of the distal ileum and cecum. On admission, we ordered blood cultures to evaluate the fever. *Escherichia coli* was isolated, so we prescribed empirical intravenous levofloxacin. Despite 4 days of such treatment, the patient experienced fluctuating high-level fever, tachycardia, and hypotension and required intensive care. Blood was re-cultured and we additionally prescribed metronidazole. On hospital day 6, gram-positive rods were evident in an anaerobic blood culture bottle and were identified using several techniques, including Gram staining, examination of colony morphology, and VITEK 2 analysis (bioMérieux, Marcy, l'Etoile, France). The smooth gray colonies of rod-shaped non-sporulating bacteria were gram-positive, and the bacterial cells occurred either singly or in short chains. The isolate was catalase-positive and urease-negative. Glucose, galactose, maltose, sucrose, and saccharose were not fermented. VITEK MS (bioMérieux)-associated matrix-assisted laser desorption-ionization time-of-flight mass spectrometry identified *E. lenta* at a confidence level of 99.9%. For 16S rRNA sequencing, bacterial DNA was extracted, amplified, and sequenced with the aid of a 3,730 xL DNA Ana-

lyzer (sequencing service from Macrogen, Seoul, Korea). Comparison of the amplicon with database sequences (NCBI BLAST, Ez-Taxon database) revealed that the sequence was 99.9% (702/703 base pairs) identical to that of an authentic *E. lenta* strain (ATCC 25559). The minimum inhibitory concentrations of four antimicrobial agents were estimated using the Etest (bioMérieux), following the 2012 Clinical and Laboratory Standards Institute (CLSI) guideline M100-S22 [5]. The bacteria were grown on brucella agar supplemented with 5 µg/mL hemin, 1 µg/mL vitamin K1, and 5% (w/v) lysed sheep blood cells. The 2012 CLSI breakpoints [5] indicated that the isolate was susceptible to clindamycin, metronidazole, and meropenem, but resistant to ceftriaxone.

The fever and leukocytosis resolved slowly, and the patient was discharged after symptom relief. A nursing home stay was planned and follow-up outpatient visits were scheduled (Fig. 1).

DISCUSSION

E. lenta is an anaerobic, non-spore-forming, gram-positive bacillus of the *Coriobacteriaceae* first described in 1935 by Eggerth

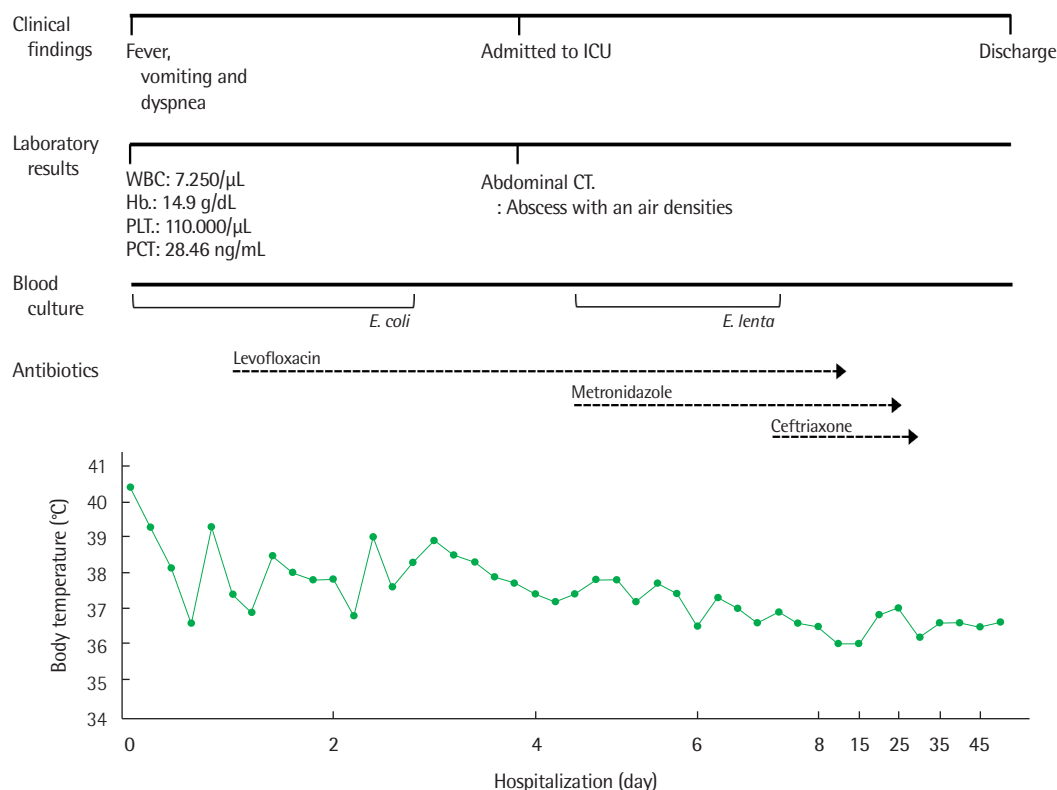


Fig. 1. Schematic diagram of the patient's clinical course. Abbreviations: Hb, hemoglobin; PLT, platelet; PCT, procaltinin.

Table 1. Reported cases of *Eggerthella lenta* infection

References	Year	Gender/ Age	Clinical presentation	Clinical specimen	Underlying health status	Method/ isolates	Identification by 16S rRNA sequencing	Antibiotic susceptibility test	Initial antibiotic treatment	Polymicrobial infection	Outcome
[1]	2015	M (52.0%) /68 (mean)	Abdominal pain (63.6%)	Blood	Gastrointestinal pathology (57.6%)	Culture, commercial enzyme kits, MALDI- TOF MS/ <i>E. lenta</i>	<i>E. lenta</i> (78.8%)	Disk-diffusion method, Etest	Metronidazole, Ceftriaxone, Piperacillin-tazobactam, Meropenem	Positive (39.4%)	Cured (48.5%)
[2]	2014	M/86	Diarrhea, fever, chills, rigor, dyspnea	Blood	Type 2 DM, ESRD, gout, gastrointestinal malignancy	Culture, commercial enzyme kits/ <i>E. lenta</i>	NT	Etest	Vancomycin, Piperacillin-tazobactam	Negative	Cured
[3]	2014	M/53	Abdominal pain, fever, chills	Blood	Rectal cancer (anterior resection with ileostomy/ Hartmann's OP/ chemotherapy)	Culture, commercial enzyme kits, MALDI- TOF MS/ <i>E. lenta</i>	<i>E. lenta</i>	NT	Cefotaxime, Amikacin	Negative	Cured
[12]	2011	F/21	Abdominal pain, nausea, vomiting, diarrhea	Blood	Crohn's disease, small bowel obstruction	Culture, commercial enzyme kits/ <i>E. lenta</i>	NT	NT	Vancomycin, Piperacillin-tazobactam	Negative	Cured
[15]	2010	F/86	Fever, dyspnea, diarrhea	Blood	Nursing home resident	Culture, commercial enzyme kits/ <i>E. lenta</i>	<i>E. lenta</i>	Disk-diffusion method, Etest	Cefuroxime, Amoxicillin	<i>Desulfovibrio desulfuricans</i>	Cured
[16]	2014	M/69	Abdominal pain	Blood	ESRD, liver cirrhosis	Culture, commercial enzyme kits/ <i>E. lenta</i>	<i>E. lenta</i>	Etest	Metronidazole, Flumoxef	<i>Pseudomonas putida</i> , <i>Bacteroides vulgatus</i>	Cured
[17]	2008	M/70	Erythema, increase in local temperature, pain on palpation	Synovial fluid	Stroke, hypertension, rheumatoid arthritis	Culture, commercial enzyme kits/ <i>E. lenta</i>	NT	Etest	Amoxicillin-clavulanic acid	Negative	Cured
[18]	2012	M/19	Fever, fatigue, poor appetite, nonproductive cough, nausea, vomiting, weight loss	Blood	Asthma, cholecystitis	Culture/ <i>E. lenta</i>	NT	NT	Metronidazole, Ceftriaxone	Negative	Cured
[19]	2012	M/78	Poor appetite, abdominal discomfort	Liver aspirate through drainage catheters	Multiple hepatic abscesses	Culture/ <i>E. lenta</i>	<i>E. lenta</i>	NT	Meropenem, Vancomycin	Negative	Cured
[20]	2009	F/82	Back pain, localized tenderness	Bone biopsy, aspiration of the disc space	Bed bound, vertebral compression fractures secondary to osteoporosis	Culture/ <i>E. lenta</i>	NT	NT	Ceftriaxone, Cloxacillin	Negative	Cured
This report	-	M/73	Abdominal pain, fever, nausea, vomiting, diarrhea	Blood	Stroke, hemiplegia, intra-abdominal abscess	Culture, commercial enzyme kits, MALDI- TOF MS/ <i>E. lenta</i>	<i>E. lenta</i>	Etest	Levofloxacin	<i>Escherichia coli</i>	Cured

Abbreviations: DM, diabetes mellitus; ESRD, end-stage renal disease; Hartmann's OP, Hartmann's operation; MALDI-TOF MS, matrix-assisted laser desorption/ionization time-of-flight mass spectrometry; NT, not tested.

[6]. The bacterium was previously named *Eubacterium lentum*, but genetic analysis performed in 1999 showed that the bacterium merited its own genus [7]. *Eggerthella* and *Eubacterium* can be differentiated from closely related genera, including *Propionibacterium*, *Bifidobacterium*, *Lactobacillus*, and *Actinomyces*, on the basis of acid-production patterns upon growth in peptone/yeast extract/glucose broth. However, the bacteria are fastidious and slow-growing, and correct identification of *E. lenta* at the species level is difficult using conventional methods. Not even biochemical or fermentative reactions can reliably identify *Eubacterium* to the subspecies level [8].

Over the last decades, various commercial enzyme-based kits identifying clinically relevant anaerobes have been developed. These include the RapID-ANA II panel (Thermo Fisher Scientific Inc., Lenexa, KS, USA), the Minitek systems (BBL Microbiology Systems, Cockeysville, MD, USA), the Vitek Anaerobe Identification (ANI) card (bioMérieux), the BBL Crystal ANR ID kit (BD Diagnostics, Sparks Glencoe, MD, USA), and the API rapid ID 32A and API 20A systems (bioMérieux) [9-11]. 16S rRNA sequencing is useful for confirming an *E. lenta* infection and is considered to be the gold standard [12]. Although we used the VITEK 2 ANI card, VITEK MS, and 16S rRNA sequencing, we suggest that the VITEK 2 system alone is adequate; the system is in use by many hospitals.

We reviewed 10 reports of laboratory-documented *E. lenta* bacteremia occurring from 2008 to 2015 (Table 1). Initially, traditional methods of bacterial identification (Gram staining, culture, and biochemical techniques) were used. Molecular techniques, including real-time PCR or microarray analysis, were secondarily employed to identify the causative organisms (71.4%). Many patients (81.0%) exhibited symptoms of gastroenteritis associated

with diarrhea and/or vomiting. Abdominal pain was also often present. Those infected by *E. lenta* were already ill, and included patients hospitalized in intensive care units, the elderly, and patients with diabetes and/or chronic kidney failure (86.0%). Catheters (tubes inserted into blood vessels or the gallbladder) and other bodily tubes (e.g., running from the nose to the stomach) were common causes of bacteremia (19.0%). Several antimicrobial susceptibility testing methods (broth and agar dilution methods, disk-diffusion tests, the Etest, and automated testing systems) were used. The isolates were commonly susceptible to both clindamycin and metronidazole (Table 2).

In our case, *E. coli* was cultured from blood taken on the first day of hospitalization. Although we (empirically) prescribed levofloxacin, an intermittent fever (over 38.9°C) persisted for 4 days. On day 5, *E. lenta* was detected in the blood. After commencement of metronidazole, the fever slowly resolved. Because the isolate was resistant to levofloxacin but susceptible to metronidazole, we considered that the bacteremia was caused by a mixed infection of *E. coli* and *E. lenta* (the latter is not a normal component of skin flora). At the time of admission, the intra-abdominal abscess was the only obvious source of infection.

Recent reports have shown that several *E. lenta* infections were associated with the use of intrauterine devices, spondylodiscitis, female genital tract infections, cutaneous abscesses, and bacteremia (in Crohn's disease patients) [1-4, 12]. These data emphasize the importance of further investigation for bacterial virulence factors. It is suspected that transfer of *E. lenta* from an intra-abdominal abscess to the bloodstream may reflect a defect in the gastrointestinal tract; *E. lenta* is normally a gut commensal bacterium [13, 14]. Some reports found that *E. lenta* infection caused morbidity

Table 2. Antimicrobial susceptibility testing results of previously reported *Eggerthella lenta* infections

References	Metronidazole	Clindamycin	Imipenem	Amoxicillin-clavulanic acid	Penicillin G	Trimethoprim-sulfamethoxazole	Meropenem	Chloramphenicol
[1]	S (100%)*	S (91.0%)*	NR	S (100%)*	S (39.0%)*	NR	S (100%)*	NR
[2]	S	S	NR	NR	R	NR	NR	NR
[3]	S	NR	S	NR	NR	NR	NR	NR
[15]	S	S	S	S	R	NR	NR	R
[16]	S	NR	NR	NR	R	NR	S	S
[17]	S	S	S	S	S	NR	NR	NR
[18]	S	NR	S	NR	NR	NR	S	NR
This report	S	S					S	

*Numbers within parentheses represent the proportions of patients responding to antibiotics. Abbreviations: NR, not reported; R, resistant; S, susceptible.

and mortality associated with septic shock and multiple organ failure. Although the pathogenesis of *E. lenta* bacteremia has not been well described [15], 10 recent reports indicate that the prognosis is rather favorable [1-3, 12, 15-20]. Our patient required intensive care for several days but eventually recovered. Few data on *E. lenta* infections or the optimal treatment thereof are available.

In summary, we have reported a case of bacteremia caused by *E. lenta* in an elderly patient with an intra-abdominal abscess. We also reviewed the current literature.

요 약

*Eggerthella lenta*는 그람 양성이면서 포자는 형성하지 않고 운동성이 없는 혐기성 간균으로서 주로 사람의 장에서 분리되며 임상 검체에서는 드물게 발견된다. 특히 균혈증인 경우 심각한 임상 경과를 초래하지만 동정이 쉽지 않고 보고가 적어 *E. lenta*의 감염과 치료에 관한 자료를 쉽게 접할 수 없었다. 이에 저자들은 복강 내 농양을 가진 노인 환자에서 발생한 *E. lenta* 균혈증 1예를 문헌 고찰과 함께 보고하는 바이다.

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