

Case Report



Epidural Abscess Caused by *Eikenella corrodens* in a Previously Healthy Child

Ye Kyung Kim ,¹ Mi Seon Han ,^{1,2} Song I Yang ,¹ Ki Wook Yun ,^{1,2}
Doo Hee Han ,³ Jae Yoon Kim ,⁴ Eun Hwa Choi ^{1,2}

¹Department of Pediatrics, Seoul National University Children's Hospital, Seoul, the Republic of Korea

²Department of Pediatrics, Seoul National University College of Medicine, Seoul, the Republic of Korea

³Department of Otorhinolaryngology, Seoul National University Hospital, Seoul, the Republic of Korea

⁴Department of Pediatrics, National Medical Center, Seoul, the Republic of Korea

OPEN ACCESS

Received: Nov 2, 2018

Revised: Dec 29, 2018

Accepted: Jan 4, 2019

Correspondence to

Eun Hwa Choi

Department of Pediatrics, Seoul National University Children's Hospital, Seoul National University College of Medicine, 101 Daehak-ro, Jongno-gu, Seoul 03080, the Republic of Korea.

E-mail: eunchoi@snu.ac.kr

Copyright © 2019 The Korean Society of Pediatric Infectious Diseases

This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<https://creativecommons.org/licenses/by-nc/4.0/>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ORCID iDs

Ye Kyung Kim

<https://orcid.org/0000-0001-7145-8738>

Mi Seon Han

<https://orcid.org/0000-0002-3896-1400>

Song I Yang

<https://orcid.org/0000-0003-4251-5152>

Ki Wook Yun

<https://orcid.org/0000-0002-0798-6779>

Doo Hee Han

<https://orcid.org/0000-0003-3367-1495>

Jae Yoon Kim

<https://orcid.org/0000-0002-9399-7481>

ABSTRACT

Eikenella corrodens rarely causes invasive head and neck infections in immunocompetent children. We report a case of epidural abscess caused by *E. corrodens* in a previously healthy 13-year-old boy who presented with fever, headache, and vomiting. On physical examination upon admission, there was no neck stiffness, but discharge from the right ear was observed. Brain magnetic resonance imaging (MRI) revealed approximately 4.5-cm-sized epidural empyema on the right temporal lobe as well as bilateral ethmoid and sphenoid sinusitis, right mastoiditis, and right otitis media. During treatment with vancomycin and cefotaxime, purulent ear discharge aggravated, and on follow-up brain MRI, the empyema size increased to 5.6×3.4 cm with interval development of an abscess at the right sphenoid sinus. Burr hole trephination was performed, and foul-smelling pus was aspirated from the epidural abscess near the right temporal lobe. Pus culture yielded *E. corrodens*. Endoscopic sphenoidotomy was also performed with massive pus drainage, and the same organism was grown. The patient was treated with intravenous cefotaxime for 3 weeks and recovered well with no other complications. Therefore, *E. corrodens* can cause serious complications in children with untreated sinusitis.

Keywords: Epidural abscess; Sinusitis; *Eikenella corrodens*

INTRODUCTION

Eikenella corrodens, one of the *Haemophilus*, *Aggregatibacter*, *Cardiobacterium*, *Eikenella*, *Kingella* (HACEK) group, is fastidious, slow-growing, facultatively anaerobic, gram-negative rod commonly found in oral cavity, gastrointestinal and genitourinary tracts.¹⁾ Since recognized as a clinical pathogen in 1974, *Eikenella* infections have been described primarily in adults. *Eikenella* species is known to cause central nervous system (CNS) infection, sinusitis, endocarditis, intraabdominal infection, liver abscess, and osteomyelitis in adults.^{2,3)} However, *E. corrodens* infection in children and adolescents have rarely been reported and clinical characteristics of *Eikenella* infections in children are not well described.⁴⁾

Here, we report a case of *E. corrodens* epidural abscess complicated by sinusitis in a previously healthy 13-year-old boy who recovered after management with antibiotics and surgery.

Eun Hwa Choi <https://orcid.org/0000-0002-5857-0749>**Presentation**

This case report was presented on the poster session at the 9th Asian Congress of Pediatric Infectious Diseases, Fukuoka, Japan, November 10–12, 2018.

Conflict of Interest

No potential conflict of interest relevant to this article was reported.

Author Contributions

Conceptualization: Yang SI, Han DH, Choi EH. Data curation: Yang SI, Han DH. Investigation: Kim YK, Yun KW. Supervision: Yun KW, Kim JY, Choi EH. Writing - original draft: Kim YK. Writing - review & editing: Han MS, Choi EH.

CASE

A 13-year-old boy was referred to our hospital for management of uncontrolled fever. A week prior to referral to the hospital, he had headache, vomiting, and fever. During the 2 months before this visit, he complained of occasional headaches requiring no medical attention. He denied any specific past medical history including recurrent acute otitis media or sinusitis. The patient was managed with oral amoxicillin/clavulanic acid for 5 days with a diagnosis of bacterial sinusitis. His symptom did not respond to the management, and he was first admitted to other hospital where he began to receive empirical treatment with intravenous vancomycin and cefotaxime under the impression of bacterial meningitis. At this admission, the patient was alert and oriented, had a fever up to 40°C with chill. Initial laboratory results were as follows: white blood cell (WBC) count 2,300/μL (81.4% neutrophils, 17.9% lymphocytes), hemoglobin 12.2 g/dL, platelet count 43,000/μL. Lumbar puncture and brain imaging were not performed.

Two days later, he was referred to our hospital because his symptoms worsened. On admission, he was febrile and conscious, but drowsy for a brief moment. No abnormalities were found in the cardiovascular, respiratory or gastrointestinal systems. He did not have signs of meningeal irritation nor show abnormal neurologic signs. His pupils were normal, but purulent discharge from right ear was noticeable. Right tympanic membrane was erythematous and bulging.

His initial vital signs were as follows: blood pressure, 144/61 mmHg; pulse rate, 140 beats per minute; respiratory rate, 20 breaths per minute; and axillary temperature, 39.5°C. A complete blood count revealed a WBC count of 5,850/μL, with a differential of 87.2% neutrophils, 11.1% lymphocytes, and 1% monocytes. The hemoglobin was 12.2 g/dL and platelet count was 21,000/μL. C-reactive protein was 10.96 mg/dL and erythrocyte sedimentation rate was 6 mm/hr.

Brain magnetic resonance imaging (MRI) revealed 4.5 cm sized diffusion restrictive lesion with air-fluid level anterior to right temporal lobe suggesting epidural empyema. Sphenoid sinusitis along with bilateral ethmoid sinusitis, right mastoiditis and otitis media were also noticed (**Fig. 1A**). Lumbar puncture was performed on the third hospital day when platelet counts were 33,000/μL. Lumbar puncture demonstrated clear cerebrospinal fluid (CSF)

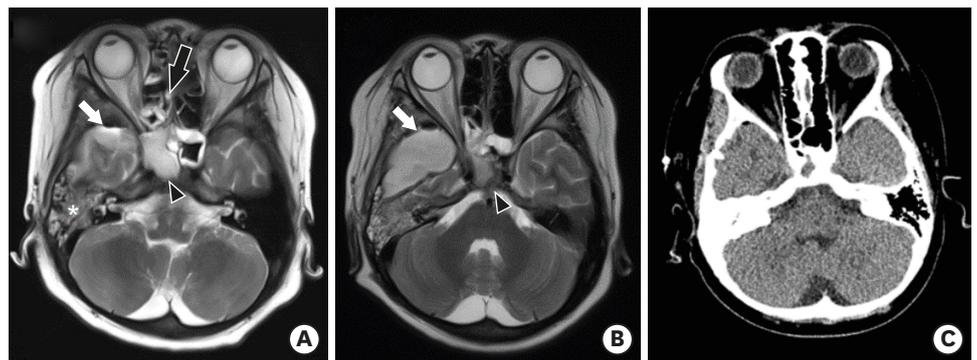


Fig. 1. Brain T2 weighted image show 4.5×3.5 cm sized epidural empyema with air-fluid level in the right temporal lobe (white arrow) as well as bilateral ethmoid (black arrow), sphenoid sinusitis (arrow head), and mastoiditis (asterisk) (A), empyema size increase to 5.6×3.4 cm (white arrow) with interval development of an abscess at the right sphenoid sinus (arrow head) (B). Post-operative brain computed tomography showed near-complete removal of epidural abscess and fluid accumulated in the sphenoid sinus (C).

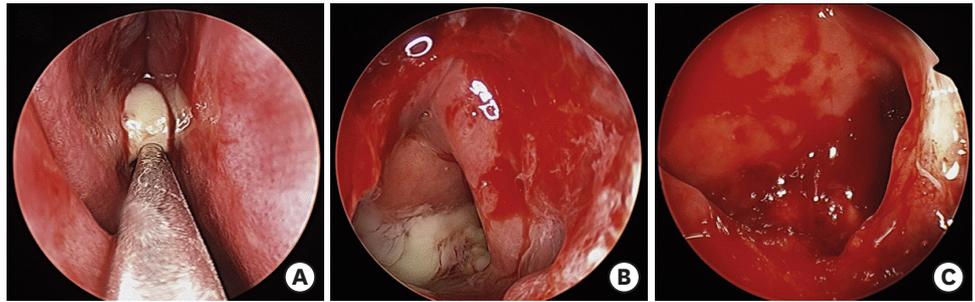


Fig. 2. Endoscopic view of the right sphenoid sinus. During endoscopic sinus surgery, pus gushed out from the sphenoid sinus ostium (A). Endoscopic images show the remaining pus on the floor of the sphenoid sinus (B) and the sphenoid sinus after vigorous irrigation (C).

with an opening pressure of 27.5 cmH₂O. CSF analysis revealed 10 lymphocytes/mm³, zero polymorphonuclear cell, protein of 53 mg/dL and glucose of 61 mg/dL. No organism grew from CSF and blood. Culture of ear discharge grew *Staphylococcus epidermidis*, suggesting contamination of skin flora. The patient continued to receive intravenous cefotaxime and vancomycin and the fever resolved after 8 days.

On the 7th day, intravenous meropenem replaced cefotaxime because of redeveloped high fever and increased amount of purulent otorrhea. Increased size of subdural or epidural empyema to 5.6×3.4 cm and probable abscess formation at right sphenoid sinus were noticed on follow up brain MRI (**Fig. 1B**). Exploratory burr hole trephination of cranium and endoscopic sphenoidotomy were performed (**Fig. 2**). During the burr hole trephination, 13 mL of foul-smelling pus was evacuated from the abscess that was located at epidural space near the right temporal lobe. Sphenoid sinus with accumulated pus was massively irrigated with normal saline. Immediate postoperative brain CT revealed near complete removal of the epidural abscess and fluid within the sphenoid sinus (**Fig. 1C**). Following surgery, fever subsided and general condition improved gradually. Bacterial culture of pus obtained from epidural empyema and specimens taken from right sphenoid sinus yielded *E. corrodens*. It was sensitive to ceftriaxone, imipenem, amikacin, gentamicin, and levofloxacin but was nonsusceptible to penicillin. Vancomycin and meropenem were discontinued after 12 days of administration and cefotaxime was resumed. He was discharged without any symptoms after completing 23 days of intravenous cefotaxime treatment. He continued oral cefixime for 3 weeks. He remains well until 6 months after surgery.

DISCUSSION

We report a case of *E. corrodens* epidural abscess presumably originated from sphenoid sinusitis in a previously healthy child. The patient recovered without complications after the management with antibiotics and surgical intervention.

E. corrodens is commonly found in oral cavity, gastrointestinal, and genitourinary tracts as normal flora.⁵⁾ It has been reported primarily in adults presenting head and neck infection, sinusitis, pulmonary infection, cervical spinal epidural abscess, endocarditis, and liver abscess.^{2,5,7)} As *E. corrodens* is inhabitant of oropharynx, head and neck infections were most frequently reported, some of which were associated with dental manipulation and human bites.^{8,9)} Patients having predisposing factors were more commonly affected than those who

did not have; Sheng et al.⁸⁾ reported about two thirds of patients (63–77%) had underlying medical illness including malignancy, alcoholism, stroke, or diabetes mellitus, and Brooks et al.⁷⁾ demonstrated 95% of cases had medical illness or history of trauma. It mostly presents indolent and prolonged course and often causes polymicrobial infection with coexisting organisms such as *Staphylococci*, *Streptococci*, and *Bacteriodes* species, and *Escherichia coli*.^{4,7)}

Pediatric *E. corrodens* infection has been reported less frequently than adults. Paul et al.⁴⁾ demonstrated *E. corrodens* could be a significant pathogen in children by reviewing 54 cases of pediatric *E. corrodens* infection. As reported in adults, head and neck region (41%) was most commonly affected, followed by extremities (16%), CNS (11%), gastrointestinal tract (9%), and respiratory tract (9%). Coinfection with other organisms was also commonly observed, and predisposing factors for infection had a greater association with *Eikenella* infection.

Literature search revealed 16 cases of CNS infection in children among 38 cases of *Eikenella* infection from 1944 to 2015.^{9,19)} CNS infection caused by *Eikenella* species included subdural, epidural, intraparenchymal and intraventricular abscess, meningitis and septic cavernous sinus thrombosis. Sinusitis preceding the development of CNS infection was found in 7 patients, and 3 had congenital cyanotic heart disease. Foreign body aspiration was noted in 2 cases and trauma history in one case. In addition to antibiotic administration, surgical procedures such as drainage of abscess, sinusectomy, or mastoidectomy were required to cure the *Eikenella* CNS infection except one case.

Seven cases of *Eikenella* infection in adults have been reported in Korea.^{6,20-25)} The majority of them had predisposing factors and their mean age was 62.9 years old with male preponderance. Three presented pulmonary infection such as lung empyema. Others presented with a cervical epidural abscess, gastrostomy site infection, liver abscess, and mediastinal abscess. It had a tendency to form abscess involving liver, mediastinum or lung area in 4 cases. However, to our knowledge, there was no report of *E. corrodens* infection in children and adolescents in Korea.

In particular, this report illustrated epidural abscess developed from chronic sphenoid sinusitis in a previously healthy boy. Initial brain MRI suggested that epidural empyema to right temporal lobe area was secondary to chronic sphenoid sinusitis. Furthermore, *E. corrodens* grew from both the epidural abscess and right sphenoid tissue, which supports that sphenoidal sinusitis was the primary lesion of epidural abscess. This patient had occasional headaches that were never treated with antibiotics, which might have led to a formation of bacterial abscess in the sinuses. At the time of presenting worsening symptoms of sinusitis and fever, *E. corrodens* might have already resulted in subsequent spread to the temporal lobe. When a patient with acute sinusitis shows worsening symptoms or signs of increased intracranial pressure, a high index of suspicion for intracranial extension is essential.

E. corrodens was often overlooked as pathogens for sinusitis. There are several reasons: 1) There are always possibilities of contamination since it is normal flora of oral cavity.¹⁾ 2) It usually takes indolent course until symptoms appear.⁴⁾ 3) It has not been regarded as a critical or common pathogen in bacterial sinusitis.

E. corrodens has shown distinct antibiotics susceptibility pattern from that of other anaerobes.⁷⁾ This bacterium has been primarily susceptible to penicillin, amoxicillin, third generation cephalosporins, carbapenems, and new quinolones.⁸⁾ Although it is a facultative

anaerobe, antibiotics against anaerobes such as clindamycin and metronidazole are reported to be resistant.⁸⁾ Aminoglycosides are reported to be relatively ineffective.⁷⁾

This case was first treated with vancomycin and cefotaxime as the empirical antibiotics for bacterial meningitis, but he did not respond well. After a drainage of abscess and sinusotomy, the patient finally recovered. The improvement after operation supports that adequate and timely surgical management is critical to achieve clinical resolution with favorable outcome.^{4,8)}

In conclusion, *E. corrodens* can cause serious complication, particularly in children with untreated bacterial sinusitis. Clinician should consider brain abscess as a complication of bacterial sinusitis. *E. corrodens* should be investigated as a possible pathogen causing sinusitis and CNS infection even in previously healthy children.

REFERENCES

1. Knudsen TD, Simko EJ. *Eikenella corrodens*: an unexpected pathogen causing a persistent peritonsillar abscess. *Ear Nose Throat J* 1995;74:114-7.
[PUBMED](#) | [CROSSREF](#)
2. Nordholm AC, Vøgg ROB, Permin H, Katzenstein T. *Eikenella corrodens* endocarditis and liver abscess in a previously healthy male, a case report. *BMC Infect Dis* 2018;18:35.
[PUBMED](#) | [CROSSREF](#)
3. Decker MD, Graham BS, Hunter EB, Liebowitz SM. Endocarditis and infections of intravascular devices due to *Eikenella corrodens*. *Am J Med Sci* 1986;292:209-12.
[PUBMED](#) | [CROSSREF](#)
4. Paul K, Patel SS. *Eikenella corrodens* infections in children and adolescents: case reports and review of the literature. *Clin Infect Dis* 2001;33:54-61.
[PUBMED](#) | [CROSSREF](#)
5. Brill CB, Pearlstein LS, Kaplan M, Mancall EL. CNS infections caused by *Eikenella corrodens*. *Arch Neurol* 1982;39:431-2.
[PUBMED](#) | [CROSSREF](#)
6. Jeon SH, Han DC, Lee SG, Park HM, Shin DJ, Lee YB. *Eikenella corrodens* cervical spinal epidural abscess induced by a fish bone. *J Korean Med Sci* 2007;22:380-2.
[PUBMED](#) | [CROSSREF](#)
7. Brooks GF, O'Donoghue JM, Rissing JP, Soapes K, Smith JW. *Eikenella corrodens*, a recently recognized pathogen: infections in medical-surgical patients and in association with methylphenidate abuse. *Medicine (Baltimore)* 1974;53:325-42.
[PUBMED](#) | [CROSSREF](#)
8. Sheng WS, Hsueh PR, Hung CC, Teng LJ, Chen YC, Luh KT. Clinical features of patients with invasive *Eikenella corrodens* infections and microbiological characteristics of the causative isolates. *Eur J Clin Microbiol Infect Dis* 2001;20:231-6.
[PUBMED](#) | [CROSSREF](#)
9. Drake AF, Wolf GT, Fischer JJ. *Eikenella corrodens* as a cause of recurrent and persistent infections of the head and neck. *Am J Otolaryngol* 1986;7:426-30.
[PUBMED](#) | [CROSSREF](#)
10. Fernández PB, Suárez JP, Messing-Jünger AM. Case-based update: primary intraventricular brain abscess in a 10-year-old child. *Childs Nerv Syst* 2015;31:2235-8.
[PUBMED](#) | [CROSSREF](#)
11. Mittal MK, Zimmerman RA. Meningitis and epidural abscess related to pansinusitis. *Pediatr Emerg Care* 2009;25:267-8.
[PUBMED](#) | [CROSSREF](#)
12. Karunakaran R, Marret MJ, Hassan H, Puthuchery SD. *Eikenella corrodens* from a brain abscess. *Malays J Pathol* 2004;26:49-52.
[PUBMED](#)

13. Nakao A, Choh H, Yamashita Y, Takenaka N, Okada K, Takeuchi Y. Acute subdural abscess due to mixed infection of *Eikenella corrodens* and *Streptococcus constellatus*. *Kansenshogaku Zasshi* 2001;75:977-80.
[PUBMED](#) | [CROSSREF](#)
14. Sane SM, Faerber EN, Belani KK. Respiratory foreign bodies and *Eikenella corrodens* brain abscess in two children. *Pediatr Radiol* 1999;29:327-30.
[PUBMED](#) | [CROSSREF](#)
15. Assefa D, Dalitz E, Handrick W, Lietz R, Braun W, Michalski H. Septic cavernous sinus thrombosis following infection of ethmoidal and maxillary sinuses: a case report. *Int J Pediatr Otorhinolaryngol* 1994;29:249-55.
[PUBMED](#) | [CROSSREF](#)
16. Maniglia AJ, Goodwin WJ, Arnold JE, Ganz E. Intracranial abscesses secondary to nasal, sinus, and orbital infections in adults and children. *Arch Otolaryngol Head Neck Surg* 1989;115:1424-9.
[PUBMED](#) | [CROSSREF](#)
17. Swanston WH, Cameron ES, Ramchander V. *Eikenella corrodens* brain abscess in a child with congenital heart disease. *West Indian Med J* 1988;37:243-5.
[PUBMED](#)
18. Rubenstein JE, Lieberman MF, Gadoth N. Central nervous system infection with *Eikenella corrodens*: report of two cases. *Pediatrics* 1976;57:264-5.
[PUBMED](#)
19. Marsden HB, Hyde WA. Isolation of *Bacteroides corrodens* from infections in children. *J Clin Pathol* 1971;24:117-9.
[PUBMED](#) | [CROSSREF](#)
20. Ko GJ, Rhie EJ, Choi HS, Kim SS, Choi JE, Lim HS, et al. A case of liver abscess due to *Eikenella corrodens* caused by human bites. *Infect Chemother* 2004;36:118-21.
21. Kang SY, Lee HJ, Suh JT. A case of *Eikenella corrodens* isolated from percutaneous endoscopic gastrostomy wound. *J Clin Pathol Qual Control* 1999;21:281-6.
22. Yoo CG, Song YW, Woo JH, Han SK, Choe KW, Kim KY, et al. *Eikenella corrodens* infection which caused mediastinal abscess in association with tuberculous mediastinitis. *Korean J Infect Dis* 1988;20:233-7.
23. Kim SM, Oh HS, Choi YJ, Kim YO. Isolation of the *Eikenella corrodens* from an aspirate of empyema. *Korean J Clin Lab Sci* 1988;20:169-74.
24. Kwon OH, Choi YS, Chong Y, Lee SY. *Eikenella corrodens* Isolation from an aspirate of empyema developed following a stomach cancer surgery. *Korean J Pathol* 1978;12:413-7.
25. Chong Y, Lee SH, Lee SY. *Actinomyces israelii* and *Eikenella corrodens* isolation from a pleural effusion case. *Yonsei Med J* 1972;13:50-9.
[PUBMED](#) | [CROSSREF](#)

요약

*Eikenella corrodens*는 구강 상재균으로 두경부 감염을 주로 일으키나 면역력이 정상인 소아청소년에게 감염을 일으키는 경우는 흔하지 않다. 저자들은 발열, 두통, 구토를 증상으로 입원한 이전까지 건강하였던 13세 남자에게서 *E. corrodens* 감염에 의한 중추신경계 경막 외 농양을 진단하여 보고하는 바이다. 초기에 시행한 신체검진에서 경부 강직은 없었으나, 우측 이리가 관찰되었다. 뇌 magnetic resonance imaging (MRI) 영상소견에서 4.5 cm 크기의 경막 외 농양이 우측 측두엽 부근에서 발견되었고, 양측 사골동염 및 접형동염, 우측 유양돌기염과 중이염이 동반되었다. Vancomycin과 cefotaxime 투약 중에도, 임상증상이 호전되지 않고 추적 MRI에서 경막 외 농양의 크기가 증가하고, 우측 접형동에 농양이 형성되어 항균요법과 함께 천두술과 내시경적 접형동 절개술을 시행하였다. 수술 시 경막 외 농양과 접형동에서 악취가 나는 고름이 다량 흡인되었으며 두 부위에서 흡인된 검체 모두에서 *E. corrodens*가 배양되었다. 수술 이후 3주 동안 cefotaxime 정맥주사로 치료받고 합병증 없이 회복하였다. 결론적으로, *E. corrodens*는 건강한 소아청소년에서 치료되지 않은 세균성 부비동염에 합병하여 중추신경계 농양의 원인이 될 수 있다.