

Treatment of *Eikenella corrodens* and *Actinomyces odontolyticus* Foot Abscess in a Penicillin-Allergic Patient

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Eikenella corrodens is a non-spore-forming, anaerobic, gram-negative bacillus. *Actinomyces odontolyticus* is a non-spore-forming, anaerobic, gram-positive, branching filamentous rod. These organisms comprise part of the normal oropharyngeal flora and are often associated with infections due to human bite wounds. Both of these organisms are slow growing, and it may take over one week from time of injury to clinical disease manifestation. Infections due to these organisms are often chronic and may lead to abscess formation. Recommended treatment options for *E. corrodens* infections include penicillins, third-generation cephalosporins, carbapenems, and fluoroquinolones. *A. odontolyticus*-associated disease is generally treated with high doses of penicillin.¹ We describe a case of mixed *E. corrodens* and *A. odontolyticus* foot abscess secondary to a toothpick puncture in a penicillin-allergic patient, which was successfully treated with doxycycline.

Case Report

A 39-year-old African American female with a history of type 2 diabetes mellitus and hyperlipidemia was admitted for evaluation of difficulty ambulating as well as pain and swelling of her right foot that had worsened over 2 days. Two days prior to presentation, she sustained a toothpick puncture to her right foot; she removed the toothpick intact and did not know whether it had been used. Her

OBJECTIVE: To report a case of *Eikenella corrodens* and *Actinomyces odontolyticus* foot abscess secondary to a toothpick puncture in a penicillin-allergic patient that was successfully treated with a long-term course of doxycycline.

CASE SUMMARY: A 39-year-old woman with diabetes mellitus type 2 and hyperlipidemia presented with difficulty ambulating as well as pain and swelling of her right foot. Prior to presentation, she sustained a toothpick puncture to her right foot; she removed the toothpick intact and did not know whether it had been used. Due to a penicillin allergy, she began treatment with levofloxacin, which was changed to clindamycin one day later. The patient was diagnosed with right Achilles tendonitis/cellulitis and was discharged on a one-week course of clindamycin. Twenty-five days later she was readmitted, complaining of pain and swelling in the same area, which this time presented as an abscess. Upon this admission, vancomycin and levofloxacin were initiated and incision and drainage (I & D) was performed. Cultures and sensitivities from I & D were significant for *E. corrodens* and *A. odontolyticus*, and treatment was changed to intravenous doxycycline 100 mg every 12 hours for 10 weeks. Oral doxycycline 100 mg every 12 hours was then used for 3 months, and treatment was successful.

DISCUSSION: *E. corrodens* and *A. odontolyticus* are 2 slow-growing organisms that are part of the normal oropharyngeal flora. Extraoral infections due to either of these organisms may be difficult to treat and might need lengthier treatments than are necessary for most infections. First-line treatment for such infections is penicillins and cephalosporins; however, in a patient with penicillin allergy, treatment options become limited, as there is potential cross-reactivity with other agents.

CONCLUSIONS: Patients with infections secondary to *E. corrodens* and/or *A. odontolyticus* in whom penicillin allergy is a concern can be treated effectively with doxycycline.

KEY WORDS: abscess, *Actinomyces*, allergy, *Eikenella*, penicillin.

Ann Pharmacother 2008;42:1706-10.

Published Online, 14 Oct 2008, www.theannals.com, DOI 10.1345/aph.1L257

home medications included rosiglitazone, metformin, rosuvastatin, aspirin, and folic acid. In addition, her social history was significant for smoking (10 pack years) and she reported an allergy to penicillin, with a reaction of hives. On physical examination, the toothpick puncture site on the right foot was visible and the area was tender and surrounded by mild erythema. In addition, edema was present on the woman's foot and calf.

Author information provided at the end of the text.

Upon the patient's admission to the emergency department, a set of blood cultures was obtained and a tetanus shot was administered (Figure 1). The patient also received one dose of intravenous levofloxacin 750 mg in the emergency department. She was transferred to the general medicine unit one day later, where therapy was changed to intravenous clindamycin 600 mg every 8 hours. Blood cultures were negative and an X-ray of the tibia/fibula showed no significant findings. A bone scan ruled out osteomyelitis and magnetic resonance imaging (MRI) of the ankle showed a partial tear of the Achilles tendon and ruled out abscess formation. As a result of the diagnostic tests performed, she was diagnosed

with right Achilles tendonitis/cellulitis. Her leg was immobilized and casted, she continued treatment with intravenous clindamycin, and on day 7 the patient was discharged home on oral clindamycin 450 mg every 6 hours for one week.

She was readmitted 25 days later complaining of pain and swelling in the same area, which now presented as an abscess measuring 5 × 10 cm with purulent discharge. Because of her penicillin allergy, intravenous vancomycin and oral levofloxacin were initiated. Incision and drainage (I & D) was performed at bedside on day 3 and the specimen was sent for Gram stain, culture, and sensitivities. On day 5, an X-ray of the ankle was repeated and once again showed

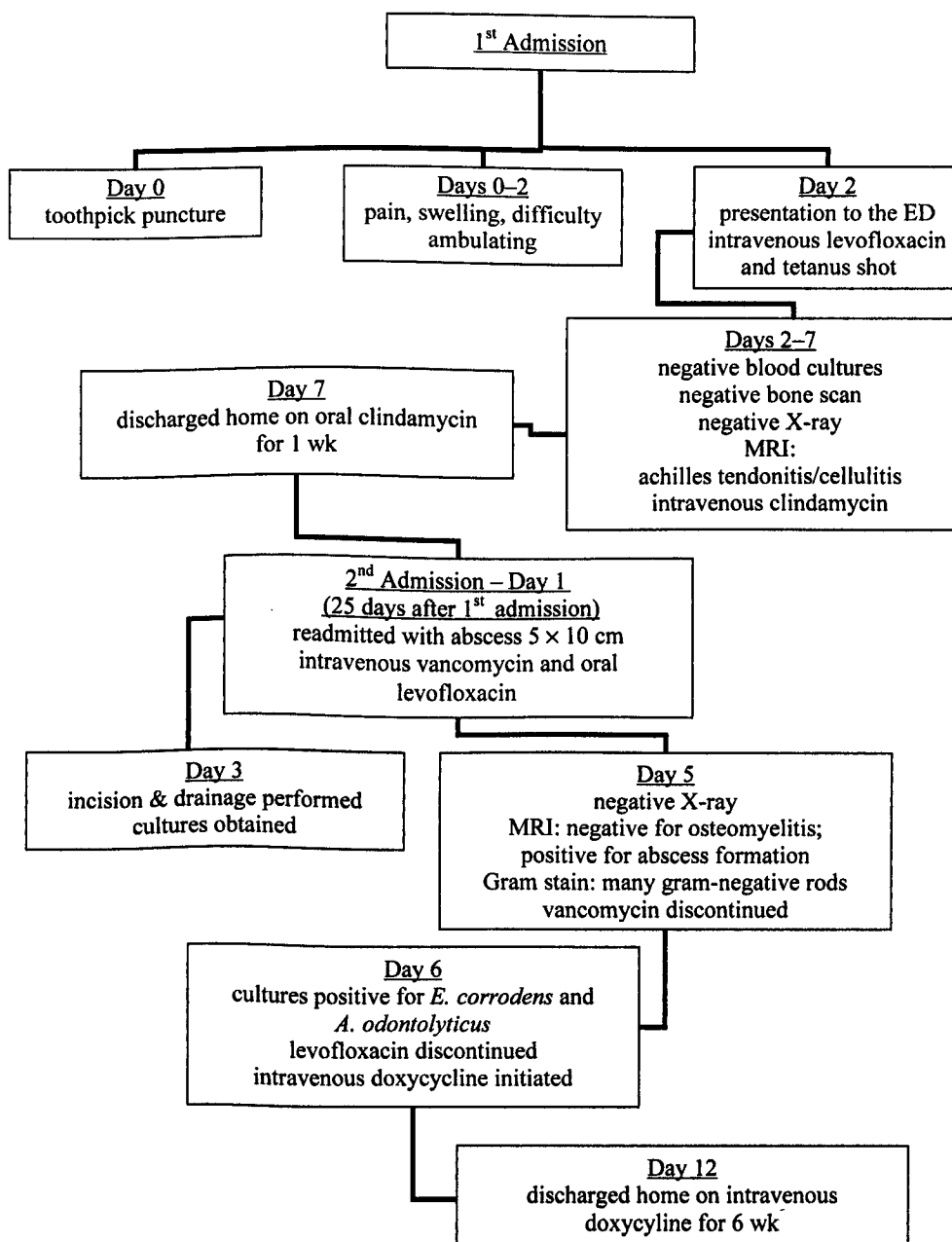


Figure 1. Treatment course of infection. ED = emergency department; MRI = magnetic resonance imaging.

no significant findings. An MRI of the ankle showed no evidence of osteomyelitis but was significant for abscess formation. In addition, the Gram stain showed many white blood cells and gram-negative rods; as a result, vancomycin was discontinued. The next day, the culture was significant for *E. corrodens* and *A. odontolyticus*. Although *E. corrodens* was sensitive to imipenem, levofloxacin, cefepime, ceftazidime, tetracycline, trimethoprim/sulfamethoxazole, piperacillin/tazobactam, and ampicillin/sulbactam, our patient could not be treated with penicillins or carbapenems due to the risk of cross-reactivity. *E. corrodens* was sensitive to levofloxacin; however, levofloxacin does not provide any coverage against *A. odontolyticus*. Therefore, levofloxacin was discontinued and intravenous doxycycline 100 mg every 12 hours was initiated. The patient was diagnosed with a right foot abscess and was discharged on day 12 with a peripherally inserted central catheter to receive a long-term (6 wk) course of doxycycline.

Two weeks later, she was referred to our hospital by her primary physician, due to increased swelling in her right foot. The patient was not experiencing pain or difficulty ambulating, she was afebrile, and she reported full adherence to the medication regimen. Hyperpigmentation was noted over the affected area, but there was no discharge. The general surgical team evaluated the patient and decided that no acute surgical interventions were necessary, and an MRI of the right tibia/fibula ruled out abscess formation and osteomyelitis but was significant for cellulitis. The patient was then seen by an infectious diseases consultant (the same physician as on the previous admission), who recommended continuing treatment with intravenous doxycycline for an additional 4 weeks, after which oral doxycycline would be started for 3 months. Blood cultures were negative, swelling decreased, and the patient was discharged on day 4 of this admission.

Three months after she was discharged, the patient had a follow-up appointment with her primary physician; she had completed her 3-month regimen of doxycycline and reported no pain. In addition, her primary physician saw no evidence of cellulitis or signs/symptoms similar to those of her previous admissions.

Discussion

According to the guidelines published by the Infectious Diseases Society of America, skin and soft tissue infections secondary to *E. corrodens* should be treated with ampicillin/sulbactam or cefoxitin.² In addition, the organism is uniformly resistant to first-generation cephalosporins, macrolides, clindamycin, metronidazole, erythromycin, and aminoglycosides, which limits treatment options.^{2,3} Steinberg et al.³ recommended first-line treatment with ampicillin, penicillins, and second- and third-generation cephalosporins and second-line treatment with tetracyclines.⁴ Although β -lactamase production is uncommon by *E. corrodens*, it may be inhibited by

clavulanate or sulbactam. Published reports have recommended a long-term course of high-dose penicillin for treatment of *A. odontolyticus*, and erythromycin, doxycycline, or clindamycin for patients who are allergic to penicillin.⁵

There have been multiple cases reported of *E. corrodens* foot infections and foot osteomyelitis including several that were due to toothpick punctures just as in our patient (Table 1), and those infections were all treated with either cephalosporins or penicillins.⁶⁻¹¹ However, when researching for concomitant infections due to both organisms, we found only 2 cases reported where these 2 organisms were the cause of mandibular osteomyelitis and the patients in both cases were treated with penicillin.¹¹ Since both of these organisms are part of the normal human oral flora, it can be expected to find them causing mixed oral infections. But to our knowledge, there have been no previously reported cases of extraoral infections secondary to both *E. corrodens* and *A. odontolyticus*. In addition, according to Brown,¹² *A. odontolyticus* is not an organism likely to affect extremities, and bone involvement is quite unusual.

Conclusions

Although the mainstay of treatment for these organisms is penicillin, the case presented here indicates that infections secondary to *E. corrodens* and *A. odontolyticus* may be treated with doxycycline in patients for whom penicillin allergy is a concern. In addition, in this patient, incision and drainage led to the determination of the causative organisms, which in turn led to successful treatment of the infection. Therefore, I & D or debridement should always be performed along with the provision of the appropriate antibiotic therapy.

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Table 1. Extraoral *Eikenella corrodens* Infections

Reference	Age, y	Sex	Site of Infection	Organisms Cultured	Treatment
Nebreda (1997) ⁶	63	M	plantar ulcer	<i>E. corrodens</i> , <i>Corynebacterium</i> spp.	surgical debridement, drainage
	86	M	intraabdominal abscess	first culture: <i>E. corrodens</i> , <i>Escherichia coli</i> , <i>Enterococcus faecalis</i> second culture: <i>E. corrodens</i> , viridans group streptococci	surgical debridement, piperacillin, tobramycin, metronidazole
	58	M	intraabdominal abscess	first culture: <i>E. corrodens</i> , viridans group streptococci second culture: <i>E. corrodens</i> , viridans group streptococci	first treatment: surgical debridement, penicillin second treatment: ampicillin, tobramycin, metronidazole
	62	M	intraabdominal abscess	<i>E. corrodens</i> , <i>E. coli</i>	surgical debridement, tobramycin, metronidazole
	40	M	intraabdominal abscess	<i>E. corrodens</i> , <i>E. coli</i> , <i>Streptococcus</i>	surgical debridement, metronidazole
Polin (1982) ⁷	9	M	secondary calcaneal OM, toothpick puncture	<i>E. corrodens</i>	upon admission: cefapirin 50 mg/kg/day iv every 6 hours for 4 days I & D on day 3 day 4: penicillin G 1 million units every 4 hours for 10 days discharge therapy: amoxicillin 500 mg 3 times/day for 5 wk
Robinson (2000) ⁸	16	F	secondary foot OM toothpick puncture	first culture: <i>E. corrodens</i> , <i>Staphylococcus epidermidis</i> , <i>Staphylococcus aureus</i> second culture: sterile	surgical drainage; first treatment: ceftazidime and nafcillin for 6 days discharge therapy: ciprofloxacin and high-dose cephalexin for 3 wk
Siegel (1992) ⁹	66	F	secondary metatarsal OM, toothpick puncture	<i>E. corrodens</i>	surgical drainage; first treatment: amoxicillin 500 mg/ clavulanic acid 125 mg po 3 times/day for 10 days second treatment: penicillin G 5 million units iv every 6 hours for 6 wk, then amoxicillin 500 mg po every 6 hours for 2 wk
Konugres (1987) ¹⁰	31	M	foot OM	first culture (ulcer): <i>S. aureus</i> , α -hemolytic and β -hemolytic <i>Streptococcus</i> second culture: <i>E. corrodens</i> , <i>S. aureus</i> , enterococci (bone culture) 3rd culture: <i>S. epidermidis</i>	surgical debridement twice, bone cultures; first treatment: nafcillin for 2 wk second treatment: nafcillin plus gentamicin third treatment: ampicillin and nafcillin
	51	M	toe OM	first culture: <i>E. corrodens</i> , <i>Bacteroides ovatus</i> , <i>Klebsiella oxytoca</i> , <i>Pasteurella multocida</i> second culture: bacteroides	debridement, bone cultures; first treatment: iv nafcillin second treatment: cefoxitin and gentamicin
	52	M	foot OM	first culture: <i>S. aureus</i> , <i>Serratia marcescens</i> , <i>E. coli</i> , enterococci second culture: <i>E. corrodens</i> , <i>Bacteroides fragilis</i> , <i>Fusobacterium</i> , <i>S. aureus</i> , <i>S. marcescens</i> , <i>E. coli</i> , enterococci third culture: no growth fourth culture: <i>Pseudomonas aeruginosa</i> , <i>S. marcescens</i>	debridement; first treatment: oral dicloxacillin and cephalexin second treatment: ampicillin, clindamycin
Paul (2001) ¹¹	3	M	secondary knee cellulites, fork puncture	<i>E. corrodens</i>	needle aspiration, ceftriaxone
	14	M	finger bite/needle puncture	<i>E. corrodens</i> , coagulase-negative staphylococci, α -hemolytic <i>Streptococcus</i>	I & D; first treatment: clindamycin second treatment: amoxicillin/clavulanic acid

I & D = incision and drainage; OM = osteomyelitis.

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El Tratamiento de un Absceso del pie por *Eikenella corrodens* y *Actinomyces odontolyticus* en una Paciente Alérgica a Penicilina

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Ann Pharmacother 2008;42:1706-10.

EXTRACTO

OBJETIVO: Reportar un caso de un absceso del pie por *Eikenella corrodens* y *Actinomyces odontolyticus* secundario a una punción con un palillo de dientes, en una paciente alérgica a penicilina que fue tratada exitosamente con un curso de doxiciclina a largo plazo.

RESUMEN DEL CASO: Una mujer de 39 años de edad con diabetes mellitus tipo 2 e hiperlipidemia se presentó con dificultad para ambular, dolor e hinchazón del pie derecho. Antes de su presentación, la paciente sostuvo una punción en el pie derecho con un palillo de dientes, el cual ella removió intacto sin saber si había sido usado. Debido a una alergia a penicilina, la paciente comenzó tratamiento con levofloxacina, la que fue cambiada a clindamicina un día después. La paciente fue diagnosticada con tendinitis/celulitis del tendón de Aquiles derecho y fue dada de alta en un curso de clindamicina por una semana. Veinticinco días después, la paciente fue readmitida con una queja de dolor e hinchazón de la misma área, la que en esta ocasión se presentó como un absceso. En esta admisión, se comenzó tratamiento con vancomicina y levofloxacina, y se realizó incisión y drenaje (I & D). Los cultivos y sensibilidades de la I & D fueron significativos para *E. corrodens* y *A. odontolyticus*, y el tratamiento se cambió a doxiciclina con la que la paciente fue tratada exitosamente.

DISCUSIÓN: *E. corrodens* y *A. odontolyticus* son 2 organismos de crecimiento lento que son parte de la flora orofaríngea normal. Infecciones extra-orales debido a estos dos organismos pueden ser difíciles de tratar y podrían necesitar tratamientos más prolongados. La primera línea de tratamiento para tales infecciones es las penicilinas y las cefalosporinas sin embargo, en un caso de alergia a penicilina, las opciones de tratamiento están limitadas debido a la posible reactividad cruzada con otros agentes.

CONCLUSIONES: Pacientes con infecciones secundarias a *E. corrodens* y/o *A. odontolyticus* pueden ser tratados con doxiciclina, en casos donde la alergia a la penicilina es una preocupación.

Traducido por Brenda R Morand

Traitement d'un abcès au pied à *Eikenella corrodens* et *Actinomyces odontolyticus* chez un Patient Allergique à la Pénicilline

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Ann Pharmacother 2008;42:1706-10.

RÉSUMÉ

OBJECTIF: Rapporter un cas d'abcès au pied à *Eikenella corrodens* et à *Actinomyces odontolyticus* secondaire à une piqûre causée par un cure-dent chez un patient allergique à la pénicilline et traité avec de la doxycycline.

RÉSUMÉ DU CAS: Une femme de 39 ans avec diabète de type II et dyslipidémie s'est présentée avec une difficulté à marcher, de la douleur et de l'enflure au pied droit. Avant de consulter, elle s'était blessé le pied droit avec un cure-dent qu'elle avait pu retirer intact sans toutefois pouvoir préciser si celui-ci était souillé. Compte tenu d'un antécédent d'allergie à la pénicilline, un traitement à la lévofloxacine a été débuté, lequel fut remplacé le lendemain par de la clindamycine. Une tendinite (tendon d'Achille) avec cellulite fut alors diagnostiquée et la patiente a été libérée avec un traitement d'une semaine de clindamycine. Vingt-cinq jours plus tard, la patiente fut réadmise, se plaignant toujours de douleur et d'enflure à la même région, cette fois sous la forme d'un abcès. À l'admission, un traitement de vancomycine et de lévofloxacine fut débuté et un drainage de l'abcès fut effectué. Les cultures et sensibilités effectuées sur le liquide de drainage ont montré la présence de *E. corrodens* et de *A. odontolyticus* et l'antibiothérapie fut alors modifiée pour de la doxycycline, laquelle s'est révélée efficace.

DISCUSSION: *E. corrodens* et *A. odontolyticus* sont 2 micro-organismes à croissance lente qui font partie de la flore oropharyngée normale. Les infections extra-orales causées par ces micro-organismes peuvent être difficiles à traiter et peuvent nécessiter des traitements antibiotiques prolongés. Les traitements de premier recours pour ces infections sont les pénicillines et les céphalosporines mais les options thérapeutiques peuvent s'avérer limitées lors d'allergie à la pénicilline étant donné le risque de réaction croisée avec d'autres médicaments.

CONCLUSIONS: Les patients avec des infections causées par *E. corrodens* et/ou *A. odontolyticus* et qui présentent une allergie à la pénicilline peuvent être traités avec la doxycycline.

Traduit par Alain Marcotte