

Case Report

Needle Licker's Osteomyelitis Revisited: An Unusual Case of Vertebral Osteomyelitis with *Eikenella corrodens* in a Diabetic Patient

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Vertebral osteomyelitis due to *Eikenella corrodens* is extremely rare. We report an unusual case of an infection caused by *E. corrodens* in a self-insulin-administering patient with diabetes. Similar to needle licker's osteomyelitis, our case shows most likely the same pathomechanism and stresses the importance of correct insulin application.

1. Introduction

First identified by Eiken in the 1950s [1], *Eikenella corrodens* is a facultative anaerobic Gram-negative bacillus corroding the surface of solid culture media. It colonizes the mucosal surfaces of the oral cavity and the upper respiratory tract. This fastidious rod is frequently overgrown by other organisms and therefore commonly missed in routine aerobic cultures [2]. We describe an unusual case of vertebral osteomyelitis due to *E. corrodens* in a patient with diabetes. We believe that infection caused by *E. corrodens* was secondary to saliva contamination from removing the cap of the insulin pen with teeth prior to injecting insulin subcutaneously. Our case illustrates an unusual mechanism for vertebral osteomyelitis similar to needle licker's osteomyelitis due to intravenous drug abuse. To the extent of our knowledge, this is the first reported case of a patient with insulin-dependent diabetes contracting this disease.

2. Case

A forty-eight-year-old man presented to the emergency department with a 6-week history of constantly worsening

low back pain. He had no fever, night sweats, or any radiating pain in his lower extremity. He reported no open wounds or diarrhoea; no history of recent urinary tract infections, pneumonia or urogenital procedures, and toothache or dental visits. He is married, has two children and a dog, and is working as a deputy manager of a sewer cleaning company. There was no history of journeys to non-European countries in the recent past. The patient has had moderately well-controlled type 1 diabetes for 8 years and was on intensified insulin therapy (HbA1c 7.2%).

Physical examination showed an afebrile patient in good general condition with pain on palpation in the lumbar spine. Initial blood test results were as follows: the C-reactive protein level was 21 mg/L (norm <8 mg/L), the white blood cell count was 11.7 G/L (norm 4.0–10.0 G/L), the hemoglobin was 131 G/L (norm 140–180 G/L), and the normal platelet count was 256 G/L (norm 150–300 G/L). Three sets of blood cultures taken 12 hours apart revealed no bacterial growth. The serology for *Brucella* was negative. An X-ray image of the spine revealed an arcuate closure anomaly of the last lumbar vertebra (L5) but otherwise an age-based normal lumbar spine, especially without any evidence of osteolysis. However, the initial magnetic

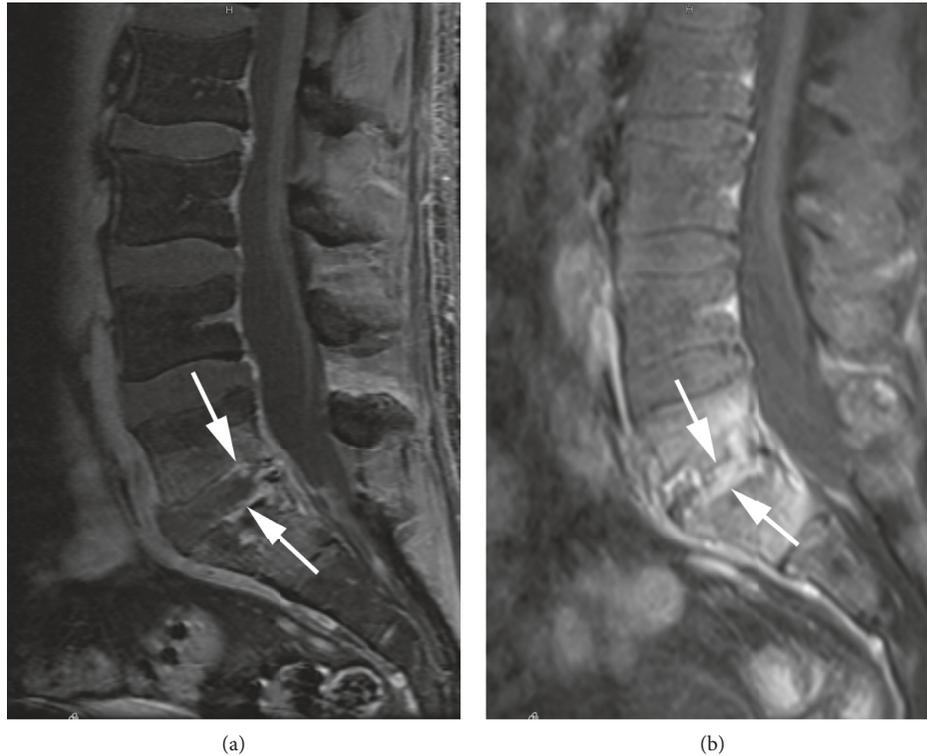


FIGURE 1: T1-weighted fat-suppressed lumbar spine MR images after contrast agent administration. (a) Initial MRI demonstrating spondylodiscitis L5/S1 with subtle contrast agent enhancement of both intervertebral disk L5/S1 and adjacent subchondral bone (arrows). (b) A follow-up MRI at 4 months showing progressive spondylodiscitis (arrows) without abscess formation.

resonance image (MRI) of the spine showed spondylodiscitis of L5 and S1 (Figure 1(a)).

Percutaneous biopsy under fluoroscopy with a collection of two punches of 15 mm each (including parts of the spinal disc) was performed, followed by an empirical antibiotic treatment with 2.2 g of intravenous amoxicillin/clavulanic acid given every 6 hours. The histological analysis of bone tissue showed only nonspecific changes as described in vertebral osteomyelitis caused by fastidious organisms [3]. From the punches, 4 separate microbiological cultures, mycobacterial cultures, a GeneXpert MTB/RIF nucleic acid amplification test (Cepheid, Axon Lab AG, Switzerland), and two broad-range 16S ribosomal ribonucleic acid (rRNA) gene PCRs, as described by Bosshard et al. [4], were performed. Both eubacterial PCRs were positive for *E. corrodens*, and one of the four cultures grew *Cutibacterium acnes* (considered as contamination). The antibiotic regimen was changed to a single daily dose of ceftriaxone 2 g IV as an outpatient for two weeks followed by oral levofloxacin 500 mg twice daily for five weeks.

Transthoracic echocardiography showed no relevant heart valve defect, abnormal structural changes, or paravalvular abscess. After one week of discharge from the hospital, regular clinical, laboratory, and radiological follow-up examinations were performed. Antibiotic treatment was stopped after 7 weeks (9 weeks in total). A follow-up MRI scan at 4 months, performed because of persisting back pain, showed progressive spondylodiscitis but no abscess formation (Figure 1(b)), which was assessed as a normal course

of healing spondylodiscitis. One year after diagnosis, the patient still complained of persisting moderate, motion-dependent back pain. The pain improved continuously. At the last follow-up after 18 months, the patient had fully recovered.

On further investigation for possible infection mechanisms, we discovered that the patient has been usually removing the cap of his insulin pen with his teeth prior to injecting the insulin. As a common commensal of the oral cavity and saliva, *E. corrodens* was probably introduced into the bloodstream with an insulin injection causing hematogenous vertebral osteomyelitis. The patient subsequently received refresher training on correct insulin pen handling and injection technique.

3. Discussion

E. corrodens is part of the normal human oropharyngeal flora and saliva. As part of the HACEK group, *E. corrodens* is associated with endocarditis [5]. However, *E. corrodens* is the least common cause of HACEK endocarditis and has been described only in patients with risk factors like recent dental therapy or intravenous drug users (IVDU) [6]. However, this was not the case in our patient.

Besides endocarditis, *E. corrodens* is mostly isolated from soft-tissue infections. Rare cases of osteomyelitis were associated with direct [7] or indirect inoculation of saliva like betel quid chewing [8], fingernail biting [9], human bite [10],

TABLE 1: Cases of vertebral osteomyelitis associated with *Eikenella corrodens* (mod according to [18]).

Author/year	Location	Previous spine surgery	Revision	Study type	Risk factor
Peerebom et al. 1987 [20]	Cervical	Yes	Yes	Case report	Diabetes Cervical spine surgery
Bridgman et al. 1990 [19]	Lumbar	No	No	Case report	Dental treatment (15 mm)
Noordeen et al. 1992 [21]	Lumbar	No	No	Case report	Dental extraction (9 m)
Raab et al. 1993 [22]	Lumbar	No	No	Case report	Mixed aortic graft infection (6 m)
Emmett et al. 2000 [23]	Thoracic	No	No	Case report	None
Lehman et al. 2000 [7]	Cervical	No	Yes	Case report	Pharyngeal injury (3 m)
Zeifang et al. 2002 [26]	Lumbar	No	Yes	Case report	Not known
Ang and Ngan 2002 [25]	Lumbar	Yes	Yes	Case report and review	Spinal surgery
Sayana et al. 2003 [24]	Lumbar	No	No	Case report	None
Tsai et al. 2009 [8]	Lumbar	No	Yes	Case report	Poor oral hygiene, betel quid chewing
Yetimoglu et al. 2014 [18]	Cervical	Yes	Yes	Case report and review	Spinal surgery
This case	Lumbar	No	No	Case report and review	Diabetes Insulin injection

toothpick injuries [11], fist-fighting injuries [12], and “needle licker’s injuries” in IVDU [13, 14].

Complications due to an infection associated with intravenous drug abuse are often related to contamination or inadequate techniques of application. IVDU are commonly more affected with osteomyelitis of the spine [15]. A review of the literature showed that 53% of the reported cases had an affected vertebral column [15]. An association between drug users and *E. corrodens* infections was first made in 1974 by Brooks et al. [16] in a report of 38 cases of skin abscesses in drug users associated with *E. corrodens* with most of the infections being polymicrobial. In the reported cases, drug users were “skin poppers” who licked their skin before injecting the drug. There were also cases of *E. corrodens* infections in methylphenidate drug abusers who crushed the tablets with their teeth before injection. One reason for licking the needle or the skin prior to injection seems to be a misconception that saliva may clean the injection site or may coat the needle and allow the needle to penetrate into the skin more easily. Reasons included ritualistic practices, cleaning the needle, enjoying the taste of the drug, checking the “quality” of the drug, and checking that the needle was in usable condition [17].

Similar to needle licker’s osteomyelitis, our case report shows most likely the same pathomechanism: removing the cap of the insulin pen with the teeth prior to injection for many years possibly being the source of the *E. corrodens* and leading to the infection of the spine.

There are only very few cases found in the literature related to *E. corrodens* infections of the spine. A review of the literature [18] of the past years shows, in the majority of the cases, that this infection occurs in the lumbar region without any previous surgical procedures. Until now, there are only 11 published cases of spinal infections caused by *E. corrodens* [7, 8, 18–26] (see Table 1). Most infections were of hematogenous origin. Where specific risk factors for *E. corrodens* spine infection were described, these were either spinal surgeries (3/11 cases), dental extractions (2/11 cases), or poor dental hygiene (1/11 cases), and one in each of the following: mixed aortic graft infection (1/11 cases) and a pharyngeal injury (1/11 cases). There were only 3 cases with no or unknown risk factors (3/11 cases). In our patient, the saliva-contaminated insulin needle may have caused

dissemination. Vertebral osteomyelitis caused by this facultative anaerobic bacterium is rare. In our case, diabetes mellitus may be a risk factor by itself, and in addition to the fact of the saliva-contaminated needle of the insulin pen, it could have increased the risk of developing vertebral osteomyelitis [27]. In other cases of vertebral osteomyelitis in diabetic patients, the primary focus of infection was found in the genitourinary tract, skin, soft tissue, endocarditis, bursitis, septic arthritis, and intravascular access.

In our case, the patient was first treated with ceftriaxone and then with levofloxacin (after initial empirical treatment with amoxicillin/clavulanic acid for two weeks). A review of the literature of all published cases shows that most of the patients were treated either with second- or third-generation cephalosporines over 6 weeks with 2 exceptions: 8-week course [24, 26] and 10-week course [19, 21]. In all cases, the outcome was full resolution of symptoms with a follow-up time ranging between 6 weeks [20] and 2 years [19] with a mean of 10 months. A study of 17 clinical isolates of *E. corrodens* found susceptibility rates of 94% for penicillin and ampicillin and 100% for ampicillin-sulbactam, amoxicillin/clavulanic acid, ceftriaxone, meropenem, and levofloxacin [5, 28].

The identification of *E. corrodens* can be difficult because of its fastidious character. This may be an additional reason why *E. corrodens* is rarely identified in vertebral osteomyelitis. At our institution, we prefer image-guided biopsy for confirming diagnosis of vertebral osteomyelitis whenever surgery is not indicated. However, it is important to acquire enough and representative tissue to increase the chance of positive cultures. In our case, perioperative prophylaxis with cefamandole could have reduced the sensitivity of bacterial cultures further. The eubacterial PCR method seems to be a good supplementary diagnostic tool in such cases [29]. With regard to the potential of false-positive results (persistence of bacterial DNA after cell death, water or skin contamination) [30], appropriate measures were taken in our laboratory to prevent contamination during analysis, thus making a false-positive result very unlikely. Although rarely described as a pathogen of native spine vertebral osteomyelitis, *C. acnes* has been considered as a contaminant in our case, as growth was only seen in one single specimen, and our patient did not have any preceding intervention [3].

In conclusion, we report a rare case of vertebral osteomyelitis caused by *E. corrodens* probably caused by incorrect handling of an insulin pen resulting in saliva-contaminated pen needles. Our case stresses the importance of careful instruction preferentially by a specifically trained diabetes nurse educator at the start of insulin therapy and, as diabetes is a chronic disease, regular reviews of the injection technique over time in order to prevent the development of poor habits. Clear instructions for the self-application of insulin exist. For example, in Switzerland, best practice guidelines for injection technique are published by the SIDB-GICID (Schweizer Interessen Gruppe für Diabetes Fachberatung-Groupe d'intérêts communs Suisse d'infirmière/iers-conseil en diabétologie) in co-operation with the FIT (Forum for Injection Technique) and should be known by every healthcare professional initiating and monitoring insulin therapy [31].

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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