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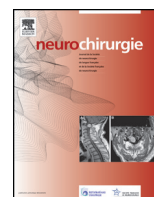


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Short clinical case

Spinal infections due to *Eikenella corrodens*: Case report and literature review



Infections spinales à Eikenella corrodens : à propos d'un cas et résumé de la littérature

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ABSTRACT

Spinal infections with *Eikenella corrodens* are rare. We report a unique case of infection caused by *E. corrodens* diagnosed more than two years after cervical surgery. All other published cases of spinal infections caused by *E. corrodens* were searched. Characteristics of this bacterium, its challenging diagnosis and therapy are discussed.

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R É S U M É

L'infection spinale à *Eikenella corrodens* est rare. Cet article rapporte un cas d'infection à *E. corrodens* survenu plus de deux ans après chirurgie cervicale. Par ailleurs, nous analysons les autres cas publiés d'infections spinales à *E. corrodens*. Les caractéristiques principales de ce germe sont décrites et, compte tenu des difficultés d'isolement de cette bactérie en culture standard, nous discutons les outils diagnostiques.

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1. Introduction

Eikenella corrodens is a ubiquitous bacterium of the oral flora. Furthermore, it colonizes the gastrointestinal and the genitourinary tract. A PubMed literature search revealed only ten cases of spinal infections caused by this bacterium (Table 1). Only one case of lumbar infection after surgery and one case of spontaneous cervical spondylodiscitis without prior surgery have been reported. A cervical infection with *E. corrodens* after a neurosurgical intervention has not been described to date.

2. Observation

A 47-year-old female desk clerk was seen in our outpatient clinic with the chief complaint of cervicobrachialgia. The major cervical pain existed for half a year and was often accompanied by cephalgias and occasionally migraine and paraesthesia of the left arm. Conservative treatment remained unsuccessful. Besides, she presented a history of a car accident with cervical distortion 3 years before, a gynaecological routine intervention 30 years ago and a motorcycle accident with mild traumatic brain injury 34 years ago. Clinical examination revealed a cervical syndrome without neurological deficits. An MRI of the cervical spine showed advanced degenerative disc disease at C4/5 and C5/6 levels, as well as a cervical kyphosis, osteochondrosis, ventral spondylosis deformans and a disc herniation at C4/5 with narrowing of the spinal canal

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Table 1
Literature review of articles reporting spinal infection of *Eikinea corrodens*.
Revue de la littérature sur des articles rapportant une infection spinale à *Eikinea corrodens*.

Name of study	Type of study	Location	Spontaneous	Postoperative	Antibiotics	Surgical revision
Ang et al., 2002 [1]	Case report et review	L4-L5	No	Yes	Yes	Yes
Bridgeman et al., 1990 [2]	Case report	Lumbar	Yes	No	Yes	No
Emmett et al., 2000 [3]	Case report	T10-T11	Yes	No	Unknown	Unknown
Lehman et al., 2000 [4]	Case report	C5-C6C6-C7	Yes	No	Yes	Yes
Noordeen et al., 1992 [5]	Case report	Lumbar	Yes	No	Yes	No
Peereboom et al., 1987 [6]	Case report	Cervical	No	Yes (transoral)	Yes	Yes
Raab et al., 1993 [7]	Case report	L3	Yes	No	Yes	No
Sayana et al., 2003 [8]	Case report	L4-L5	Yes	No	Yes	No
Tsai et al., 2009 [9]	Case report	L4-L5	Yes	No	Yes	Yes
Zeitfang et al. 2002 [10]	Case report	L3-L4	Yes	No	Yes	Yes

with a sagittal diameter of 8 mm. Similar changes were observed at C5/6 with consecutive spinal stenosis with a sagittal diameter of 10 mm.

In order to decompress the symptomatic spinal canal stenosis, an anterior discectomy C4/5 and C5/6 with interbody fusion with a tricortical autogenous iliac crest graft and anterior plating was recommended. This procedure was conducted under routine antibioprophyllaxis (cefamandole 2 g intravenous) without any intraoperative or postoperative complications. The cervical syndrome regressed satisfactorily.

One month after the operation, at the routine postoperative assessment, the patient presented with low back pain without neurological deficits and without relevant pathologies on lumbar MRI. In addition, CT-myelography was performed and neural compression was definitively ruled out. Lumbar facet joint syndrome was diagnosed and treated with corticosteroid infiltrations.

Two years and five months after the cervical intervention, the patient was admitted at our emergency department for respiratory distress, inspiratory stridor, dysphagia and exacerbated right-sided cervicobrachial pain. The patient complained of suffering, over the past two days, from a slight progressive dysphagia since the cervical operation. During a 6-month period the patient experienced a nocturnal cervical pain (at around 4 a.m). Laboratory analysis revealed increased inflammatory parameters (C-reactive protein (CRP) 150 mg/L, leucocytes 12.6 G/L). Two blood cultures submitted for sampling were negative. Fiberoptic evaluation of the larynx did not show any typical stigmata of laryngitis. A CT scan indicated

a questionable thickening of the soft tissue over the spondylodesis. An empiric intravenous therapy with clavulanic acid and amoxicillin (2.2 g three times a day) was started with the differential diagnosis of beginning bacterial laryngitis versus viral laryngitis or questionable cervical foreign body associated infection. An MRI was able to exclude an abscess and revealed a moderate enhancement of the vertebrae C3-C6 with restricted overall interpretation of this area due to the metallic plate. Clinically, the patient improved quickly; the CRP decreased to 41 mg/L within 4 days, and co-amoxicillin was switched to oral formula (625 mg t.i.d.) and discontinued 10 days after admission (CRP 19 mg/L).

The patient was re-admitted and re-assessed 3 weeks after discontinuation of the empiric antibiotic therapy because of progressive pain during swallowing. The MRI at that time showed a reduction of the thickened soft tissue over the spondylodesis and a new intervertebral enhancement between C3 and C6 suggesting spondylodiscitis (Fig. 1A and B). Blood cultures submitted for sampling were negative. A revision operation with intraoperative sampling was suggested. Intraoperatively, the soft tissue thickening turned out to be pus. Thorough debridement with removal of the ventral plate, a C3/4 discectomy with titanium cage-augmented fusion and fresh ventral plate osteosynthesis was conducted. Samples for microbiological analysis were collected (1 swab of the pus for culture and for eubacterial polymerase chain reaction (PCR) and 1 intervertebral biopsy C3/4). Empiric intravenous antibiotic therapy with amoxicillin and clavulanic acid (2.2 g t.i.d.) was started again until definitive microbiological results were available after

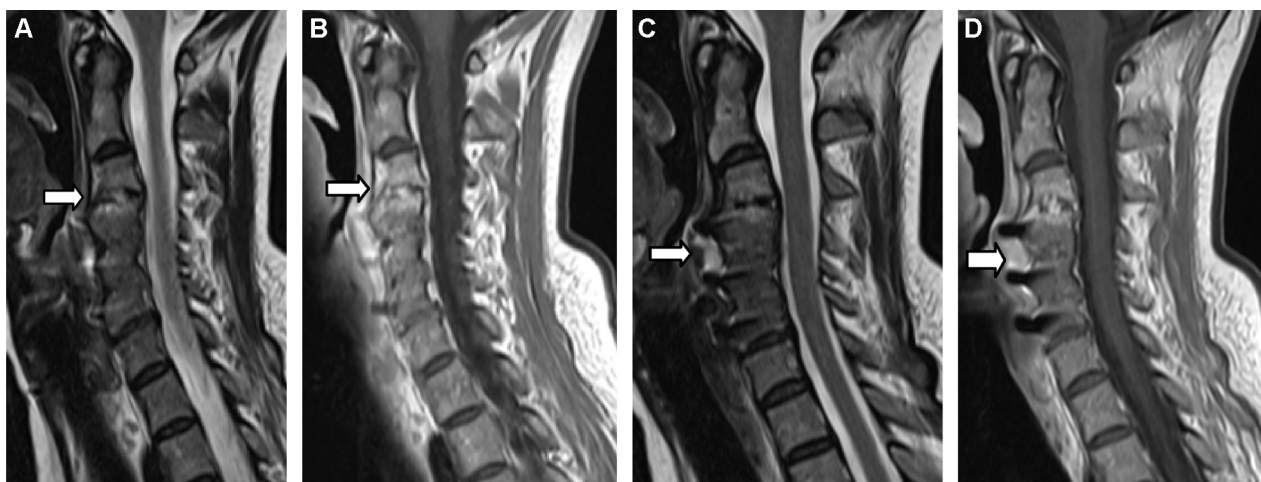


Fig. 1. A–D. MRI examination two years after spondylodesis C4–C6. T2 weighted sequences in the sagittal plane (1A) show signal intensities in the interdiscal space C3/C4 with (1B) contrast enhancement in T1 weighted sequences with gadolinium. T2 weighted sequences in the sagittal plane (1C) show signal intensities prevertebral at the height of C4 with (1D) contrast enhancement in T1 weighted sequences with gadolinium, suggesting highly spondylodiscitis with a prevertebral abscess.

Examen par IRM deux ans après spondylodèse C4–C6. En séquence T2 sagittale (1A) hypersignal en regard de l'espace interdiscal C3/C4 avec (1B) prise de contraste en séquence T1 avec gadolinium. En séquence T2 sagittale (1C) hypersignal pré-vertébral en regard de C4 avec (1D) prise de contraste en séquence T1 avec gadolinium, suggérant fortement une spondylodiscite avec abcès pré-vertébral.



Fig. 2. T1 weighted MRI sequences with gadolinium in the axial plan show prevertebral contrast enhancement at the level of interdiscal space C3/4.
IRM séquence T1 axiale avec gadolinium démontrant une prise de contraste près-vertébral au niveau de l'espace interdiscal C3/C4.

11 days. *E. corrodens* was identified in both microbiological cultures and by PCR. The antibiotic therapy was switched to intravenous ceftriaxone in an outpatient setting. A transthoracic echocardiography (TTE) was conducted but did not reveal any vegetation or valve dysfunction. According to the Duke's modified criteria (potential arterial embolus as 1 positive minor criterion) an endocarditis was unlikely [11]. Due to the patients' intolerance to daily injection, ceftriaxone was replaced after 6 days by ciprofloxacin orally (750 mg b.i.d.), after a total of 18 days with betalactamine antibiotics. Ciprofloxacin had to be discontinued 28 days later because of a bilateral Achilles tendonitis, a common side effect of fluoroquinolones. At that time the nocturnal cervical pain and dysphagia had declined completely and inflammatory parameters had normalized. MRI images showed marginal prevertebral contrast enhancement, clear regression of prevertebral soft tissue swelling, without signs of an abscess (Fig. 2). Four weeks after discontinuation of antibiotic therapy, MRI findings remained stable (Fig. 3). Signs and symptoms of an infection remained absent at the last follow-up 6 months after discontinuation of antibiotic therapy.

3. Discussion

Spinal infection due to *E. corrodens* is rare. In the majority of the cases this infection occurs in the lumbar spine without previous surgery. *E. corrodens* is a fastidious, slow-growing, facultative gram-negative rod. The pathogen primarily spread haematogenously. The entry site is classically a postulated minor mucosal lesion located in the orobuccal region. In transoral surgery the germ can also spread by continuity. The aetiology of the infection in our case remains speculative. In summary, late surgical site infections are statistically mostly caused by haematogenous spreading. Haematogenous spreading can be due to transient or persistent bacteremia. The latter situation is seen in endovascular infections i.e. in endocarditis. According to the symptoms, the inoculation of the pathogen could have occurred intraoperatively (dysphagia since the operation and nocturnal pain). According to the detected germ, haematogenous aetiology is possible as *E. corrodens* is not a skin germ and the oral mucosa was outside the operative site.

Ruling out endovascular affection in cases of *Eikenella* bacteraemia remains essential, as *Eikenella* is a HACEK organism (*Haemophilus parainfluenzae*, *Aggregatibacter aphrophilus*, *Aggregatibacter actinomycetemcomitans*, *Cardiobacterium hominis*, *E. corrodens* and *Kingella kingae*), a set of slow-growing gram-negative bacteria that form a normal part of the human flora and can be associated with endocarditis. HACEK organisms are known to cause false culture-negative endocarditis, especially if inoculated less than one week or if inoculated in non-enriched culture media. Modern culture media and automated blood culture systems keep the rate of false negative results rather low [12,13].

Because of progressive local symptoms (nocturnal pain suggesting a status of inflammation) for at least a half a year, lack of fever and other clinical stigmata of endocarditis, and because of several negative blood cultures an acute endovascular infection was not likely (low pretest probability), according to the modified Duke's criteria proposed by Li et al. [11]. In the setting of low probability a TTE is the recommended diagnostic tool of choice [11].

The identification of *E. corrodens* can be difficult due to its often minimal intricate growth in culture. This may be one of the reasons why *Eikenella* is rarely identified or associated with spinal infections. The eubacterial PCR method represents a supplementary diagnostic tool in cases of fastidious growth bacteria, particularly if the diagnostic sampling is performed under empiric antibiotic therapy [14,15].

The therapy of choice is rigorous debridement and antibiotic treatment. Due to the lack of data, there is no recommendation for implant associated infections by the HACEK group. In endovascular

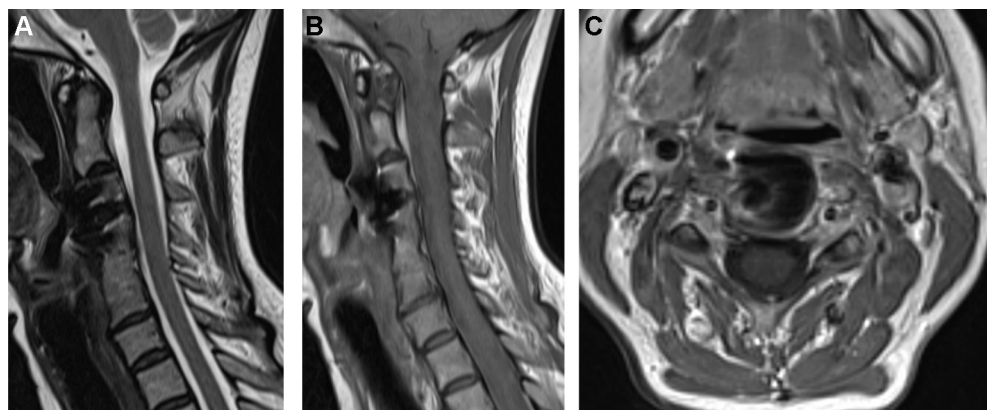


Fig. 3. A–C. In MRI examination 4 weeks after discontinuation of antibiotic therapy no more signs of discitis or prevertebral abscess in T2 sequences (3A) or T1 sequences with gadolinium (3B and 3C) are detectable in.
Quatre semaines après l'arrêt des antibiotiques l'examen par MRT ne montre plus de signes de discite ou d'un abcès près-vertébral en séquence T2 (3A), ni prise de contraste en séquence T1 avec gadolinium (3B et 3C).

infections, according to the US guidelines [16], the therapy of choice is ceftriaxone or alternatively a fluoroquinolone. European guidelines for treatment of endocarditis [17] recommend ceftriaxone or the combination of ampicillin (if sensitive) and gentamycin, or, after consulting an infectious disease specialist, alternatively a fluoroquinolone. In endocarditis with a native valve, a treatment duration of 4 weeks is necessary. Regarding gram-negative bacteria, most experience in implant associated infections has been made with enterobacteriaceae and therefore (in prosthetic joint infections [18]) an intravenous betalactamine according to the in vitro susceptibilities or alternatively ciprofloxacin (750 mg bid by oral route) is recommended. In cases of reimplantation of foreign material at the time of debridement, a prolonged time of antibiotic treatment might be warranted. Our original intention was a treatment of 8 to 12 weeks after reimplantation of foreign material and postulated chronic spondylitis. To our knowledge there are no systematic data to confirm this approach. Our patient was free of local and systemic symptoms after extensive debridement and an overall treatment during six and a half weeks with systemic antibiotic therapy. This stresses the importance of thorough debridement.

Disclosure of interest

The authors declare that they have no conflicts of interest concerning this article.

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