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CASE REPORT

Epidural abscess caused by *Veillonella parvula*: Case report and review of the literature



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Veillonella parvula, an anaerobic, Gram-negative coccus is part of the normal flora of the oral, gastrointestinal, respiratory, and genitourinary tracts in humans and animals. We herein present a case of epidural abscess caused by *V. parvula* in a 68-year-old man with sinus squamous cell carcinoma who presented with a 3-week history of low back pain. Blood and pus cultures were positive for *Veillonella* spp. After sequencing of the 16S ribosomal DNA, the pathogen was identified as *V. parvula*. Surgical debridement was performed following which the patient received intravenous administration of amoxicillin/clavulanate. To our knowledge, there are only seven reported cases of spinal infection caused by *Veillonella* spp. and these are reviewed here.

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Introduction

The annual incidence of spinal infection reported in two Scandinavian studies was one per 100,000 inhabitants and 2.2 per 100,000 inhabitants per year.^{1,2} Approximately 75% of the infections were pyogenic, and the remaining 25% were caused by tuberculosis.² The pathogens invaded the

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epidural space through local extension from a neighboring infected structure, hematogenous dissemination from a remote focal infection, or iatrogenic inoculation. However, the definite route cannot be identified in 30–40% of the cases, indicating silent seeding in the epidural space.^{3,4,5}

In adults, *Staphylococcus aureus*, *Staphylococcus epidermidis*, and *Streptococcus* account for approximately 68–80% of spinal infections, whereas anaerobic bacteria account for only 3–5%.^{1,6,7} In a previous report comprising 348 cases of pyogenic vertebral osteomyelitis, anaerobic bacteria were not involved in any of the investigated cases.⁸ *Veillonella* species are small, nonmotile, nonsporulating, anaerobic Gram-negative cocci. They are unable to use carbohydrates or amino acids, actively ferment organic acids, and produce a highly endotoxic lipopolysaccharide.⁹ Because this bacterium can only use a few glucose catabolites, especially lactic acid, for energy generation, it most commonly exists in the oral cavity of people with massive oral-bacteria-mediated lactic acid production. *Veillonella* species are always considered as commensals in the oropharynx and in the gastrointestinal, genitourinary, and respiratory tracts of humans and animals.⁹ Most studies and reviews of anaerobic infections do not even include discussions of *Veillonella* species, as these are considered nonpathogenic.

We herein present a case of epidural abscess caused by *V. parvula* in a 68-year-old man with sinus squamous cell carcinoma who presented with a 3-week history of low back pain. Surgical debridement was performed and the patient was treated with antibiotics. We also reviewed the literatures about the spinal infection caused by *Veillonella* species.

Case report

A 68-year-old man was admitted due to progressive low back pain for 3 weeks. He had a habit of chewing betel nuts for several years and had been in good health until 3 years ago. He had a stuffy nose for 3 weeks and came to our outpatient department, where computed tomography scan was performed. The scan results showed multiple heterogeneous masses over bilateral maxillary and ethmoid sinuses. Bilateral sinusotomy and turbinectomy were performed. Pathological analysis of the excised tissue showed squamous cell carcinoma (stage: T3N0M0). After the surgery, he received two doses of chemotherapeutic agents (cisplatin, 5-fluorouracil, and leucovorin) and radiation therapy (total dose, 5940 cGy). He had been in a stable condition until 3 weeks ago. He had progressive lower back pain with claudication. Because of intolerable pain, he required assistance for walking. He received some analgesics prescribed by local medical clinics for back pain, but his symptoms still progressed.

He underwent further treatment in our outpatient department for pain relief. Physical examination was performed, which revealed a temperature of 36.5°C, blood pressure of 125/81 mmHg, respiratory rate of 16 cycles/minute, and heart rate of 95 beats/minute. Knocking tenderness over his lumbar spine was noted. The straight leg-raising test, reflexes, sensation, motor function, and sphincter function were normal. Auscultation did not detect any heart murmurs. There were no Osler's nodes,

splinter hemorrhages, Janeway lesions, or Roth's spots. A peripheral hemogram revealed a leukocyte count of $9.62 \times 10^3/\mu\text{L}$, a hemoglobin level of 6.3 g/dL, and a platelet count of $249 \times 10^3/\mu\text{L}$. Serum aspartate aminotransferase level was 12 IU/L, urea nitrogen 56 mg/dL, creatinine 4.1 mg/dL, and C-reactive protein 8.27 mg/dL. The radiograph showed degenerative change over the lumbosacral spine with moderate degree marginal osteophytes. Magnetic resonance imaging (MRI) after gadolinium enhancement showed an anterior L1–L2 epidural abscess extending to vertebral bodies and paraspinal tissue (Fig. 1). A bone scan was performed, which showed accumulation of tracer over L1 and L2 vertebral bodies (Fig. 1).

He received 2 g of intravenous oxacillin every 6 hours. However, the severe low back pain persisted. Two sets of blood culture yielded *Veillonella* species. This *Veillonella* species was susceptible to penicillin, amoxicillin/clavulanic acid, cefoxitin, clindamycin, imipenem, and metronidazole. Antibiotics were shifted to amoxicillin/clavulanate (1200 mg) every 8 hours. The transthoracic echocardiogram did not show any vegetation. He underwent surgery on the 4th day of hospitalization. An epidural abscess from L1 to L2 with extension to the paraspinal area and vertebral bodies was found. Evacuation of epidural abscess was performed with laminectomy of the lumbar spine and suction-irrigation technique. Pus culture was positive for *Veillonella* species and these had the same antimicrobial susceptibility as that of species from blood culture. A single colony of bacteria was inoculated into the polymerase chain reaction (PCR) amplification mixture. The 16S ribosomal RNA (rRNA) genes were amplified by 27F (5'-AGA, GTT, TGC, ACC, TGG, CTC, AG-3') and 1522R [5'-AAG, GAG, GTG, ATC, CA(A o rG), CCG, CA-3'] primers. The PCR product was sequenced by the 1220r primer (5'-TGG, TAG, CAC, GTG, TGT, AGC, CC-3'). The sequence result was analyzed by Basic Local Alignment Search Tool and showed 100% identity with the 16S RNA gene of *V. parvula*.

After surgery, he received amoxicillin/clavulanate intravenously. His back pain and claudication subsided gradually. Two weeks after surgery, his serum C-reactive protein was within the normal limit and erythrocyte sedimentation rate was 18 mm/hour. He was discharged and maintained on oral amoxicillin/clavulanic acid 875/125 mg every 12 hours for 4 weeks. He remained symptom free at the 1-year follow-up examination.

Discussion

The genus *Veillonella* was first isolated by Veillon and Zuber in 1898; Prevot further described these bacteria in 1933 and suggested the present taxonomy.⁹ Optimal growth occurs anaerobically between 30°C and 37°C with at least 5% carbon dioxide in the atmosphere. Media containing 0.85% lactate and vancomycin or streptomycin can be used as selective media for isolation. Little has been written about the occurrence of *Veillonella* in infections, and it is difficult to evaluate the prevalence and clinical importance of *Veillonella* species, which are rare causes for serious infections such as meningitis, osteomyelitis, prosthetic joint infection, pleuropulmonary infection, endocarditis, and bacteremia.^{10,11,12,13,14,15,16,17,18,19,20}

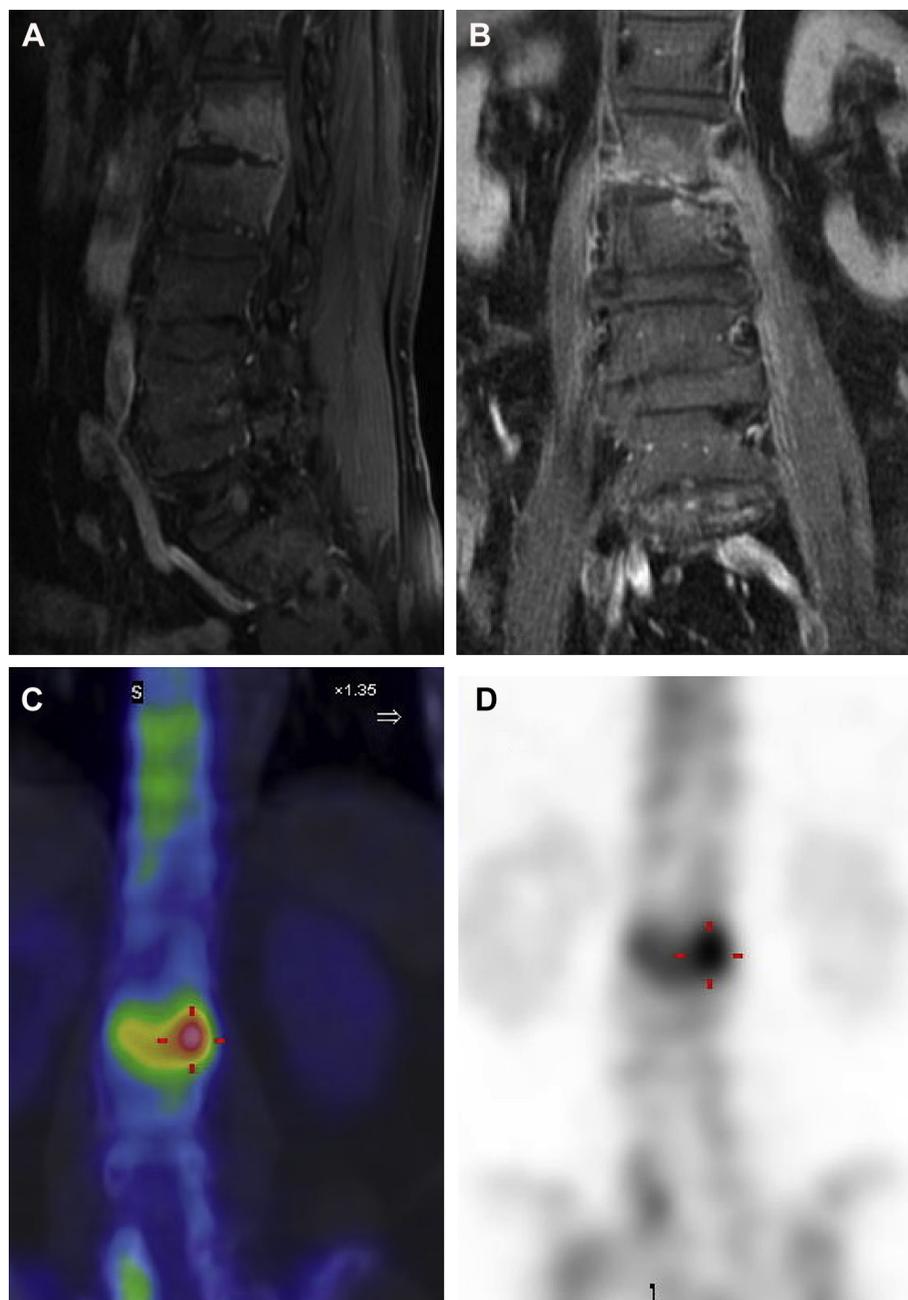


Figure 1. Magnetic resonance imaging after gadolinium enhancement shows L1–L2 epidural abscess extending to vertebral bodies and paraspinal tissue (A,B) and bone scan shows accumulation of tracer over L1 and L2 vertebral bodies (C,D).

We performed a MEDLINE search using the keywords “*Veillonella* infection”, “anaerobic osteomyelitis”, “anaerobic epidural abscess”, and “anaerobic spine infection” to search for reports/studies on spine infection caused by *Veillonella* species, and found only seven cases (Table 1).^{11,12,13,14,15,16,17} Including the present case, the median age of the patients infected was 57.8 years (range: 27–76 years). Six of the eight patients were men.^{11,13,14,15,17} Except one case with cervical spine infection,¹⁵ the remaining cases had lumbar spine infections. Except one case with odynophagia,¹⁵ all the other cases had chronic low back pain with the durations ranging

from 1 week to 4 months. *Veillonella* spinal infection seems to be having an insidious and subacute course.

In the present case, the patient was initially misdiagnosed as a case of spondylosis-associated low back pain because of a lack of fever. Early diagnosis can decrease neurologic complications and avoid surgery. Gadolinium-enhanced MRI can clearly delineate the extent of infectious spinal lesions, and it is thus beneficial for patients with refractory low back pain. In addition, the present case also showed that scintigraphy could identify the spinal osteomyelitis caused by *V. parvula*. According to the previous report, technetium-99m leukocyte scintigraphy (bone scan)

Table 1 Clinical characteristics of spinal infection caused by *Veillonella* spp.

Case no.	Age/sex	Predisposing factors	Culture	Diagnosis	Symptoms	Antimicrobial agents	Surgery	Outcome
1. (PR)	68/M	Sinus squamous cell carcinoma	Blood/pus	Epidural abscess and vertebral osteomyelitis (L1–L2)	Low back pain for 3 wk	Amoxicillin/clavulanate × 6 wk	Yes	Recovery
2. (12)	76/F	Nil	Blood/tissue	Spondylodiscitis (L1–L2)	Low back pain for 3 mo	Cefotaxime and metronidazole × 4 wk then amoxicillin/clavulanate and metronidazole × 6 wk	Yes	Recovery
3. (13)	55/M	Rectal biopsy	Blood/tissue	Discitis (L2–L3)	Low back pain for 2 mo	Ceftriaxone × 6 wk then amoxicillin/clavulanate × 6 wk	No	Recovery
4. (14)	27/M	Nil	Tissue	Spondylodiscitis (L4–L5)	Low back pain for 3 wk	Amoxicillin × 11 wk	No	Recovery
5. (15)	31/M	Esophageal rupture	Tissue	C-spine osteomyelitis	Odynophagia, pain on movement of the neck, and fever for 3 d	Penicillin × 6 wk	Yes	Recovery
6. (11)	74/M	Cariou dentition	Tissue	Osteomyelitis (T12–L1)	Low back pain for 4 mo	Penicillin × 6 wk	No	Recovery
7. (16)	61/F	Rheumatoid arthritis and Sjögren's disease	Blood/tissue	Osteomyelitis (L5–S1)	Low back pain for 1 wk	Ceftriaxone × 6 wk	Yes	Recovery
8. (17)	70/M	Nil	Tissue	Discitis (L3–L4)	Low back pain for 1 mo	Not mentioned in the article	No	Recovery

F = female; M = male; PR = present report.

seems to be better at diagnosing osteomyelitis than gallium-67 citrate scintigraphy (inflammatory scan).²¹

The genus *Veillonella* includes the following six species: *V. parvula*, *Veillonella alcalescens*, *Veillonella atypica*, *Veillonella dispar*, *Acidaminococcus fermentans*, and *Megasphaera elsdenii*; of these, only *V. parvula* and *V. alcalescens* have been isolated from clinical specimens.¹⁸ The identification of *Veillonella* isolates to the species level remains problematic, as conventional phenotypic and biochemical testing does not provide adequate discrimination between species, which requires restricted fragment-length polymorphism analysis of PCR-amplified 16S ribosomal DNA.²² Only four previous reports confirmed *Veillonella* to the species level and all are *V. parvula*, similar to the present case.^{11,13,16,17}

The risk factor for *Veillonella* spinal infection is still unknown owing to the limited number of cases available. Some underlying disorders are considered to be associated with this infection, including rectal biopsy,¹³ esophageal rupture,¹⁵ carious dentition,¹¹ and autoimmune disease.¹⁶ However, *Veillonella* spinal infection also can be found in healthy adults.^{12,14,17} Because *Veillonella* species only can use lactic acid for energy generation, they prefer hypoperfusion conditions, in which the intermediate pyruvic acid cannot be oxidatively dissimilated and will be converted into lactic acid. This is the underlying reason why they are often isolated from periodontitis or sinusitis.²³ In our present case, the patient had undergone sinus surgery, and received radiation and chemotherapy for treating sinus squamous cell carcinoma. Severe mucositis caused by these therapies may create an environment with poor perfusion and mucosal damage, which was more suitable for the colonization and invasion of *Veillonella* species.²⁴ We considered this to be the reason for infection in the case presented.

A majority of spine infections have been effectively managed with antibiotics alone, and surgery has only been required when antibiotics have failed or when there are significant or progressive neurological deficits, spinal instability, or deformity.^{25,26} In the seven reported cases of *Veillonella* spinal infection, all recovered with^{12,15,16} or without surgery.^{11,13,14,17} Administration of appropriate antibiotics is also very important. Penicillin, cefoxitin, ceftriaxone, chloramphenicol, clindamycin, and metronidazole were active against *Veillonella* isolates, which were resistant to tetracycline, vancomycin, aminoglycosides, and ciprofloxacin.^{27,28,29,30,31} The antimicrobial susceptibility test results of the pathogen in this study were also compatible with this result. However, Dr Roberts showed only one of nine *Veillonella* spp. isolates was susceptible to penicillin *in vitro*.³² In another recent study, the minimum inhibitory concentration of 176 (58%) isolates of *Veillonella* species from the oral cavity of humans was more than 1 µg/mL.³³ These penicillin G-resistant isolates had reduced susceptibility to ampicillin or amoxicillin, but were susceptible to the combination of amoxicillin and clavulanate.

In conclusion, this case is the eighth reported case of spinal infection caused by *Veillonella*. Using molecular methods, the underlying pathogen was confirmed as *V. parvula*. This case report highlights that sinus malignancy may be an important underlying disease for *Veillonella* spinal infection.

Conflicts of interest

All contributing authors declare no conflicts of interest.

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