Veillonella parvula Meningitis: Case Report and Review of Veillonella Infections

Veillonella parvula is a small, nonfermentative anaerobic gram-negative coccus that is part of the normal flora of the mouth, gastrointestinal tract, and vagina in humans. When isolated from clinical specimens, *V. parvula* is often regarded as a contaminant or commensal, but it has been implicated as a pathogen in infections of the sinuses, lungs, heart, bone, and central nervous system. Meningitis, however, is extremely rare; to our knowledge, only 2 cases have been previously described in the literature. We report a case of *V. parvula* meningitis and review the literature on *Veillonella* infections.

The genus *Veillonella* was first isolated by Veillon and Zuber in 1898; Prevot further described these bacteria in 1933 and suggested the present taxonomy [1]. Of 6 species of anaerobic gram-negative cocci—*Veillonella parvula*, *Veillonella alcalescens*, *Veillonella atypica*, *Veillonella dispar*, Acidaminococcus fermentans*, and *Megasphaera elsdenii*—only *V. parvula* and *V. alcalescens* have been isolated from clinical specimens [2]. *V. parvula* colonizes in coaggregation with other aerobic and anaerobic bacteria [3].

*Veillonella* species are small, nonmotile, nonsporulating organisms. Although they are unable to use carbohydrates or amino acids, they actively ferment organic acids, and they produce a highly endotoxic lipopolysaccharide [1]. They can be rapidly identified because of their red fluorescence under ultraviolet light in specific growth media [4]. *Veillonella* are commensals in the oropharynx, gastrointestinal tract, and female genital tract. Meningitis caused by *V. parvula* is extremely rare. Here we report a case of meningitis in association with chronic sinusitis in which *V. parvula* was isolated in pure culture from the CSF, and we review the literature regarding *Veillonella* infections.

A 47-year-old white woman presented with fever (temperature, \(\leq 38.9^\circ\text{C}\)) of 2 days' duration, chills, headache, and 1 day of mental-status changes. On physical examination, the patient was alert and oriented to person but not to time or place. There were no focal neurological deficits, and meningal signs were absent. The patient was treated empirically with iv nafcillin, 1 g q4h, and ceftriaxone, 1 g q.d., and, after showing no clinical change, she was transferred to our hospital on day 3 after presentation. Lumbar puncture done on the day of admission to our hospital showed the following values: CSF glucose, 2 mg/dL; protein, 304 mg/dL; WBC count, 3000 cells/mm\(^3\), with a differential of neutrophils (84%), lymphocytes (15%), and monocytes (1%); and a Gram stain revealing gram-positive cocci and gram-negative cocccabilli. The patient was treated empirically with vancomycin and ceftriaxone, and nafcillin was discontinued. A blood culture previously obtained at the referring hospital was positive for alpha streptococci and sensitive to penicillin. CSF culture grew *V. parvula*. After the CSF culture report, iv metronidazole was added to the regimen to cover anaerobes, and a source for the infection was sought. A CT scan of the sinuses showed abnormal soft tissue involving the sphenoid sinus and the posterior ethmoid region on the right. Visualized bony contours appeared to be thickened in the sphenoid and posterior ethmoid regions, suggesting a chronic inflammatory process. MRI of the head showed opacification of the right sphenoid and posterior ethmoid sinuses and soft-tissue extension into the basilar cisterns and the suprasellar cistern, with intense enhancement consistent with basilar meningitis originating from the region of the sphenoid sinus. An increased T\(_2\) signal was noted in the region of the left basal ganglia, corpus striatum, anterior commissure, and the genu of the internal capsule, possibly representing intracranial extension of the infection.

A consult with an otolaryngologist was obtained for surgical treatment. On day 8 of hospitalization, the patient underwent right endoscopic total ethmoidectomy and sphenoidotomy. The surgical specimen showed scattered mixed inflammatory infiltrates that were primarily composed of lymphocytes, plasma cells, and neutrophils suggestive of acute and chronic sinusitis. No fungal or bacterial organisms were identified on hematoxylin-eosin, Gomori’s methenamine silver, and periodic acid-Schiff stains. In the meantime, blood cultures that were obtained on the day of admission grew *Prevotella intermedia* and *Peptostreptococcus anaerobius*. Culture of fluid from the right sphenoid grew *Enterobacter cloacae* and *Propionibacterium acnes*. During the second and third weeks of hospitalization, the patient was noted to have gradual improvement in mental status and resolution of fever. She was discharged home, in stable condition, to complete a 6-week course of ceftriaxone and metronidazole. At follow-up, no sequelae were observed.

CSF, 0.5 mL, was inoculated in 10 mL of enriched thioglycollate broth (Becton Dickinson Microbiology Systems, Cockeysville, MD) and chocolate agar and was incubated at 35°C in 5% CO\(_2\). After incubation overnight, a Gram stain of the broth revealed gram-negative cocci. The broth was subcultured onto a 5% sheep blood agar plate incubated at 35°C in 5% CO\(_2\) and onto an anaerobic 5% sheep blood agar plate (Centers for Disease Control and Prevention, Atlanta) incubated at 35°C anaerobically. Colonies visible after 48 h of incubation were identified as *V. parvula*, by use of the AN-IDENT system (BioMerieux Vitek, St. Louis, MO). No growth was observed on chocolate agar.

We performed a MEDLINE search with use of the key words “*Veillonella*,” “meningitis,” and “anaerobic meningitis.” A separate search was done with use of the key words “*Veillonella*” and “infection.” We found 2 published cases of *V. parvula* men-
ingitis. The first case was that of a 3-year-old girl who injured her right eyelid with a toothbrush and who subsequently developed a right eyelid abscess complicated by meningitis [5]. The other case was that of a 6-week-old infant with tethered cord syndrome who developed mixed anaerobic meningitis caused by *V. parvula* and *Bifidobacterium* species [6]. Durand et al. [7] reviewed 493 episodes of bacterial meningitis in adults seen during a 27-year period and found that anaerobes were involved in only 3 instances; species were not identified.

As in our case patient, upper respiratory tract infection (sinusitis) has been implicated as one of the most common predisposing factors for bacterial meningitis [7, 8]. *V. parvula* is an important pathogen for periodontitis [3], and, in 1 report, it was the most common anaerobic pathogen in chronic maxillary sinusitis [9]. In our case patient, the source of *V. parvula* was presumed to be the ethmoid and sphenoid sinuses. *V. parvula* has also been implicated as a pathogen for osteomyelitis [10, 11], bacteremia [12], pelvic abscess [13], and abscessed cholecystitis with sepsis [14].

Little has been written about the occurrence of *Veillonella* in infections, and it is difficult to evaluate the prevalence and clinical importance of *Veillonella* as a pathogen. Most studies and reviews of anaerobic infections do not include discussions of *Veillonella*, probably because, most of the time, it has been considered to be a normal commensal or nonpathogenic organism. In addition, in the past, inadequate culture techniques and a high threshold for doing CSF anaerobic culture have resulted in a low recovery rate of this organism from clinical specimens. In situations in which it is cultured as a single organism, it should be considered a pathogen. When it is isolated from a specimen like CSF, then a search should be done for a source, such as imaging of the head to rule out brain abscess and imaging of the sinuses.

Because of the lack of an adequate number of reports on *Veillonella* as a pathogen, there are not many data in the literature that describe treatment strategies, especially for infections like meningitis. The few reports of the in vitro susceptibility of *Veillonella* to antimicrobial agents suggest that it is susceptible in vitro to a variety of antimicrobials and that, when appropriate antibiotics are administered, the outcome usually is good. Penicillin, cephalosporins, chloramphenicol, clindamycin, and metronidazole were active against 100% of *Veillonella* isolates [15–19]. On the basis of a review of available data, penicillin appears to be the drug of choice for *Veillonella* infections. Warner et al. [15] have suggested that metronidazole is also a safe, effective drug for the treatment of serious infections like bacteremia, brain abscess, and meningitis. However, *Veillonella* species are, in general, resistant to tetracycline, vancomycin, aminoglycosides, and ciprofloxacin, and they are only intermittently susceptible to erythromycin [15–19].

In summary, we report a case of meningitis that was caused by *V. parvula* and was suspected to be secondary to chronic sinusitis. Our case illustrates the importance of a search for the source of infection when anaerobic bacteria are isolated in culture. *Veillonella* are uncommon isolates from clinical specimens, but, in the appropriate clinical setting, they should be considered as pathogens.

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### References


