

Facklamia Species and *Streptococcus pneumoniae* Meningitis: A Case Report and Review of the Literature

Kesav C. Parvataneni, Sugantha Iyer, Riad Khatib, and Louis D. Saravolatz

St. John Hospital and Medical Center and Wayne State University School of Medicine, Detroit, Michigan

***Facklamia* sp are Gram-positive cocci that are often mistaken for viridans streptococci, but they rarely cause invasive disease. In this report, we describe a case of mixed *Facklamia* sp and *Streptococcus pneumoniae* meningitis in an immunocompetent host with sinusitis. This case demonstrates that *Facklamia* sp may be part of normal human flora but can be associated with invasive disease.**

Keywords. *Facklamia* species; meningitis; review of the literature.

Facklamia species are part of the normal female genital tract flora [1]. They have been implicated in genitourinary disease [1]. In previous studies, a small number of invasive infections have been described such as urinary tract infections, chorioamnionitis, and infective endocarditis [1,2]. Our study represents a case of acute bacterial meningitis due to *Facklamia* spp and *Streptococcus pneumoniae* coinfection.

CASE REPORT

A 41-year-old female presented with a 3-day history of nasal congestion and fevers. She has a past medical history of recurrent sinusitis and she has no history of immunocompromising conditions. She subsequently developed headaches, lethargy, and gait instability. She had no known sick contacts or recent travel. On admission, she was febrile at 101.5°F, somnolent, and had nuchal rigidity.

A lumbar puncture was performed and cerebrospinal fluid (CSF) analysis revealed a white blood count of

713/mm³ (95% polymorphonuclear), a protein level of 253 mg/L, and a glucose level of 15 mg/L. Gram stain showed Gram-positive, lancet-shaped diplococci and smaller rounded cocci.

A computed tomography scan showed bilateral ethmoid and left maxillary sinusitis (Figure 1). The patient was treated with vancomycin, ceftriaxone, and dexamethasone. The patient's blood cultures grew *S pneumoniae*. In addition, the patient's cerebrospinal fluid culture grew *Facklamia* species. Due to the blood and CSF culture discordance, both were resubcultured. Re-examination of the blood culture bottle grew *S pneumoniae* alone, whereas CSF reculture revealed 2 colony morphologies, which were identified as *S pneumoniae* and *Facklamia* species (Figure 2). Human immunodeficiency virus testing was negative. Both *S pneumoniae* and *Facklamia* species were susceptible to ceftriaxone with a minimum inhibitory concentration of 0.125 mcg/mL; therefore, vancomycin was discontinued. The patient's mentation gradually improved over the next few days, and she returned to her baseline functional status. The patient was discharged to complete a 14-day course of intravenous ceftriaxone.

DISCUSSION

Facklamia species was first discovered by Collins et al [3–7] in 1997. There are now 6 species described in the literature: *Facklamia hominis*, *Facklamia ignava*, *Facklamia sourekii*, *Facklamia languid*, *Facklamia tabacialis* sp nov, and *Facklamia miroungae* sp nov. All of

Received 29 October 2014; accepted 2 March 2015.

Correspondence: Louis D. Saravolatz, MD, MACP, 19251 Mack Ave., Suite 335, Grosse Pointe Woods, MI 48236 (louis.saravolatz@stjohn.org).

Open Forum Infectious Diseases

© The Author 2015. Published by Oxford University Press on behalf of the Infectious Diseases Society of America. This is an Open Access article distributed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivs licence (<http://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits non-commercial reproduction and distribution of the work, in any medium, provided the original work is not altered or transformed in any way, and that the work is properly cited. For commercial re-use, please contact journals.permissions@oup.com.

DOI: 10.1093/ofid/ofv029

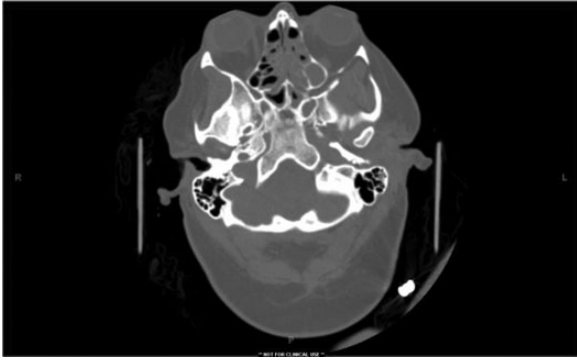


Figure 1. Computed tomography head demonstrating bilateral ethmoid sinusitis and left maxillary sinusitis.

the *Facklamia* species have been isolated from human clinical specimens with the exception of *F tabaciasalis*, which was isolated from a tobacco sample, and *F miroungae*, which was isolated from a southern elephant seal [3, 7]. These *Facklamia* species are Gram-positive cocci found as short chains or diplococci, and they are often mistaken for viridans streptococci [8]. *Facklamia* species is a weakly alpha hemolytic, facultative anaerobe that is catalase and oxidase negative, and it grows best at 37°C [1]. Likewise, viridans streptococci are alpha or nonhemolytic, anaerobic, catalase and oxidase negative, growing at 35–37°C [9]. A key difference between the 2 organisms is *Facklamia* species are positive for pyrrolidonyl arylamidase (PYR)/PYR-aminopeptidase, whereas this enzymes activity is negative in *Streptococcus viridans*. This difference is typically used to differentiate enterococci and *Streptococcus pyogenes* (positive) from *S viridans* (negative). To reliably distinguish *Facklamia* species from *S viridans*, 16S rRNA gene sequence

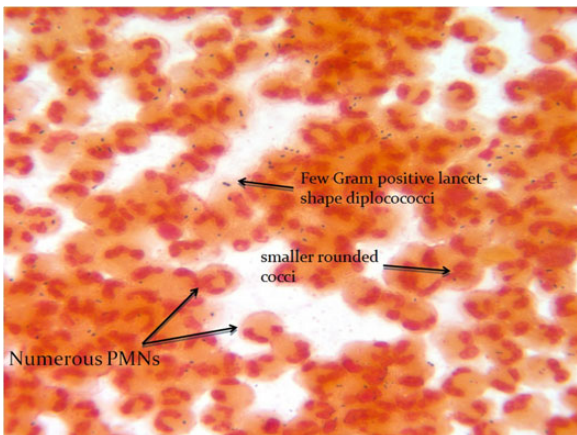


Figure 2. This is a Gram stain of the cerebrospinal fluid showing Gram-positive, lancet-shaped diplococci, and Gram-positive smaller rounded cocci.

analysis should be performed, but it may not be available due to cost and complexity of this testing. The identification of these bacteria could be problematic because few of the rapid testing systems currently include them in their databases, such as the matrix-assisted laser desorption ionization time-of-flight mass spectrometry [8]. Our case was identified by the Vitek 2-automated biochemical microbiology system. It uses a Gram-positive colorimetric reagent card with 64 test substrates. The unique properties of *Facklamia* species that allowed it to be identified by the system included positivity for L-PYR and growth in 6.5% NaCl. This result was confirmed by manual PYR/PYR-aminopeptidase retesting.

In a previous study examining 120 strains of unidentified Gram-positive cocci with phenotypic characteristics that eliminated them from the known genera of bacteria, such as *Aerococcus*, *Streptococcus*, *Enterococcus*, and *Lactococcus*, 18 strains (21.6%) of bacteria were identified as *Facklamia* species [1]. These facultative anaerobes were included in a group of previously unidentified Gram-positive cocci because they had an unusual combination of positive reactions that included only leucine aminopeptidase, L-pyrrolidonyl- β -naphthylamide, and growth in 6.5% sodium chloride for genus identification [10].

In 1 case review series, *Facklamia* species were isolated from 24 clinical specimens of human origin: 13 from blood cultures, 4 from vaginal specimens, 1 each from urine, CSF, bone, an abscess, a boil, the gall bladder, and the source was not stated in 1 case [1]. Only a handful of human infections have been described, and one contained a positive CSF culture with a limited clinical description [1]. Nineteen of 20 specimens from human cases with adequate information were from females [1]. Thus, the natural habitat in humans has been speculated to lie in the female genital tract [1].

CONCLUSIONS

The pathogenic potential of *Facklamia* species is unclear in this case. However, we know this organism has been implicated in invasive infections and isolated from the blood, bone, gallbladder, and CSF of patients [1]. It also is reasonable to conclude that *Facklamia* species may have translocated into the CSF by following *S pneumoniae*, and all of this patient's symptoms could be attributed to meningitis induced by infection with *S pneumoniae* alone. This case highlights *Facklamia* species as an organism recovered from the CSF in association with an established pathogen, *S pneumoniae*. It is important to distinguish *Facklamia* species from other Gram-positive cocci so that the true pathogenic potential of this organism can be determined.

Acknowledgments

Potential conflicts of interest. All authors: No reported conflicts.

All authors have submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest.

References

1. LaClaire L, Facklam R. Antimicrobial susceptibilities and clinical sources of *Facklamia* species. *Antimicrob Agents Chemother* **2000**; 44:2130–2.
2. Healy B, Beukenholt RW, Tuthill D, et al. *Facklamia hominis* causing chorioamnionitis and puerperal bacteraemia. *J Infect* **2005**; 50:353–5.
3. Collins MD, Hutson RA, Falsen E, et al. *Facklamia tabacinasalis* sp. nov., from powdered tobacco. *Int J Syst Bacteriol* **1999**; 49:1247–50.
4. Collins MD, Lawson PA, Monasterio R, et al. *Facklamia ignava* sp. nov., isolated from human clinical specimens. *J Clin Microbiol* **1998**; 36:2146–8.
5. Collins MD, Hutson RA, Falsen E, et al. *Facklamia sourekii* sp. nov., isolated from human sources. *Int J Syst Bacteriol* **1999**; 49:635–8.
6. Lawson PA, Collins MD, Falsen E, et al. *Facklamia languida* sp. nov., isolated from human clinical specimens. *J Clin Microbiol* **1999**; 37: 1161–4.
7. Hoyles L, Foster G, Falsen E, et al. *Facklamia miroungae* sp. nov., from a juvenile southern elephant seal (*Mirounga leonina*). *Int J Syst Evol Microbiol* **2001**; 51:1401–3.
8. Dubois D, Segonds C, Prere MF, et al. Identification of clinical *Streptococcus pneumoniae* isolates among other alpha and nonhemolytic streptococci by use of the Vitek MS matrix-assisted laser desorption ionization-time of flight mass spectrometry system. *J Clin Microbiol* **2013**; 51:1861–7.
9. Collins MD, Falsen E, Lemozy J, et al. Phenotypic and phylogenetic characterization of some *Globicatella*-like organisms from human sources: description of *Facklamia hominis* Gen. Nov., Sp. Nov. *Int J Syst Bacteriol* **1997**; 47:880–2.
10. Facklam R, Elliott JA. Identification, classification, and clinical relevance of catalase-negative, gram-positive cocci, excluding the streptococci and enterococci. *Clin Microbiol Rev* **1995**; 8:479–95.