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CASE REPORT

Facial cellulitis because of *Aggregatibacter (Actinobacillus) actinomycetemcomitans* and *Capnocytophaga* species in an immunocompetent patient

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The species of *Capnocytophaga* and *Aggregatibacter* are normal flora and mostly cause periodontal diseases. The soft tissue infection caused by *Aggregatibacter* often is associated with *Actinomyces* species. Beside, most *Capnocytophaga* infections are described in immunocompromised patients. We identified facial cellulitis caused by *Capnocytophaga* spp and *Aggregatibacter (Actinobacillus) actinomycetemcomitans* in a 16-year-old immunocompetent female.

Introduction

Bacteria of the genus *Capnocytophaga* and *Actinobacillus* occur in normal oral flora and in the presence of periodontal disease.[1,2] These organisms can cause periodontal infection, soft tissue abscess (often in association

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with *Actinomyces* species), endocarditis, and systemic infection. They are also associated with sepsis, usually in immunocompromised patients. We identified facial cellulitis caused by *Capnocytophaga* spp and *Aggregatibacter actinomycetemcomitans* (formerly in the genus *Actinobacillus*)[3] in a 16-year-old immunocompetent female.

Case report

A 16-year-old female noted the development of a mild tender left facial mass 1 month before presentation in our facility, in July 2008 (Fig. 1). She noted that the size of the mass increased slowly and was associated with increasing local heat and erythema. She originally sought medical attention and received an unknown antibiotic. In addition, a dental clinic diagnosed caries, but no procedure was performed. Thirty days after presentation, her symptoms were unchanged and she was admitted. She gave no history of tuberculosis, diabetes, or any other disease that might affect immunological function.

Physical examination indicated that she was apyrexial and had a 2 × 2 cm mass over the left mandibular area. The mass was smooth, fluctuant, and fixed deeply with overlying cellulitis. The parotid and mandibular ducts were normal, and no calculi were evident in the floor of her mouth. A tuberculin skin test was negative.

Incision and drainage of the mass yielded debris and a small amount of pus. A course of oral clarithromycin and amikacin was administered 6 days after hospitalization, but the mass was unchanged. A Gram stained film of the pus indicated no visible organisms, and a Ziehl-Neelsen stain was negative for acid fast bacilli. Pathology of the tissue indicated fragments of necrotic debris, neutrophil exudates, and aggregates of basophilic clumps that resembled sulfur granules (Fig. 2). A Giemsa stain indicated no bacilli and a Gram stain indicated no *Actinomycosis*.

A bacterial culture was negative after 48 hours, but indicated a light growth of *Capnocytophaga* species and gram-negative bacilli after 9 days. Identification of *Capnocytophaga* species was performed with the RAPID-ANA II system (Innovative Diagnostic Systems, Inc., Norcross, GA, USA). The gram-negative bacilli were identified as *Aggregatibacter actionmycetemcomitans*, based on conventional biochemical methods and confirmed by partial 16S rRNA sequence analysis [accession number M75039.1 (*Aggregatibacter actinomycetemcomitans*), identity 99% (529/530)].[3,4] A disc susceptibility test indicated that both organisms were susceptible to amoxicillin/clavulanic acid, aztreonam, cefuroxime, third-generation cephalosporins (i.e. ceftazidime, ceftriaxone), piperacillin ± tazobactam, ertapenem, and ciprofloxacin, but that *Capnocytophaga* spp was resistant to amikacin, cefazolin, and gentamicin.

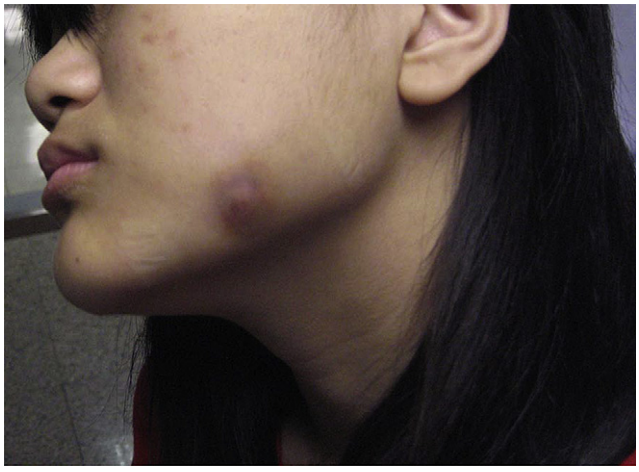

Figure 1. Clinical photograph of the left mandibular mass, about 2 × 2 cm.

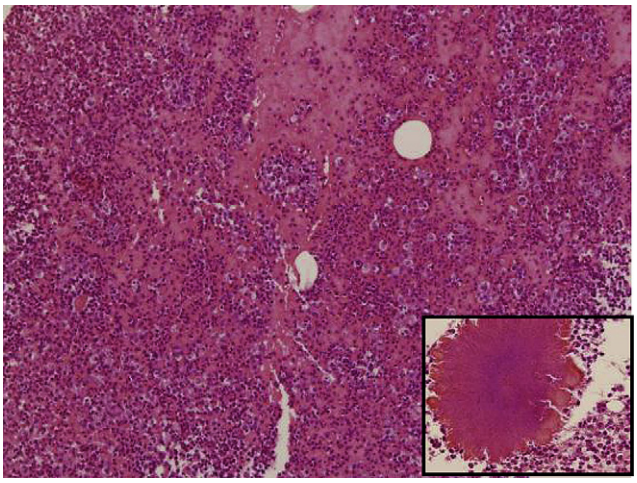

Figure 2. Pathology of the mass, with fragments of necrotic debris, neutrophil exudates, and aggregates of basophilic clumps that resemble sulfur granules (Inset).

Thus, 7 days after admission, the antibiotic was changed to intravenously amoxicillin/clavulanic acid (3.6 g daily divided into 3 doses) combined with oral clarithromycin (500 mg twice a day). The patient's symptoms improved over the next 5 days. She was nearly asymptomatic and discharged from our clinic.

Discussion

Anaerobic and microaerophilic bacteria that were previously considered harmless are now considered pathogenic.[5] These organisms can cause severe infections, especially after solid organ or hematopoietic stem cell transplantation or if introduced into otherwise sterile sites, such as during a surgical procedure. Bacteria of the genera *Capnocytophaga* and *Aggregatibacter* can occur in normal oral flora and in the presence of periodontal disease,[1,2] often in immunocompromised patients. However, *Capnocytophaga* infections have more recently been reported in immunocompetent patients.[6] *A actinomycetemcomitans* is a member of the HACEK group (*Haemophilus aphrophilus*, *Haemophilus paraphrophilus*, *A actinomycetemcomitans*, *Cardiobacterium hominis*, *Eikenella corrodens*, and *Kingella* spp), and is one of the major agents of adult and juvenile periodontitis.[2] It may occur in combination with *Acetinomyces* spp, in particular *Actinomyces israelii*,[7] in sulfur granules. We are unaware of any previous report that has identified *Capnocytophaga* spp and *A actinomycetemcomitans* as pathogens responsible for facial cellulitis in an immunocompetent patient.

A actinomycetemcomitans is a nonspore-forming, nonmotile, small, fastidious gram-negative coccobacilli that cannot grow on MacConkey agar. It also grows slowly in broth, possibly leading to delays in identification. This species was first described in 1912 by Klinger, and its classification has changed many times. *A actinomycetemcomitnas* was identified as an oral human microbe in the 1950s, and since 1962 has been considered capable of causing serious infections, such as periodontal disease, soft tissue abscess (often in association with *Actinomyces* species), systemic disease, and endocarditis.[6,7] Because of its slow growth, serologic examination may be helpful for diagnosis. Significantly elevated antibody titers occur during the active stage of infection, and the titers decrease during convalescence. Serologic examination was not performed in our patient, because this test was unavailable at our hospital.

Ampicillin or penicillin, often in conjunction with an aminoglycoside, is often used to treat infection because of *A actinomycetemcomitans*, but resistance to these antibiotics is increasingly common. Cefazolin, cefotaxime, cetriaxone, aminoglycosides, and chloramphenicol have a high degree of *in vitro* activity against this species, so should also be considered. Therapy should be guided by clinical response and *in vitro* susceptibility testing.

The seven species in the genus *Capnocytophaga* are gram-negative, fastidious, capnophilic rods with fusiform morphology and gliding motility. Species of this genus are present in the normal oral flora of humans (*Capnocytophaga ochracea*, *Capnocytophaga gingivalis*, *Capnocytophaga sputigena*) and mammals such as canines, cats, and rodents (*Capnocytophaga animorsus* and *Capnocytophaga cynodegm*i).

Capnocytophaga species are frequently isolated as part of a polymicrobial flora and have been reported as causes of localized infection, bacteremia, and sepsis in immunocompromised patients.[6,8,9] Neutropenia and oral mucositis are the most important risk factors predisposing to bloodstream infection after an endogenous infection or a wound infection from an animal bite or closed-fist injury.[6] In immunocompetent hosts, *Capnocytophaga* species are occasionally involved in localized, mostly polymicrobial infections with other oral flora.[8,9] Following an animal bite, human infection is characterized by a necrotizing eschar.[10] Alcoholics and patients who have undergone splenectomy are particularly predisposed to severe septicemia following an animal bite.

Isolation of *Capnocytophaga* requires careful collection of specimens and appropriate processing. In addition, suspicious material should be cultivated in a CO_2-enriched atmosphere. *Capnocytophaga* spp are usually susceptible to broad-spectrum β-lactams, marcolides, doxycycline, and fluoroquinolones, but are resistant to aminoglycosides and colistin. β-Lactamase-positive isolates have been found, and they were susceptible to combination therapy with β-lactamase inhibitors. Patients with septicemia generally have a good prognosis if they are empirically treated early with imipenem or a β-lactamase inhibitor combination for several weeks.

Capnocytophaga spp and *A* (*Actinobacillus*) *actinomycetemcomitans* are unusual pathogens, but can cause severe infections, mainly in immunocompromised hosts. Recent reports showed that species in these genera can also cause infections in immunocompetent hosts. This case report and other recent studies emphasize the need for appropriate culture techniques for these species, especially for lesions close to the oral cavity. In particular, cultures must be followed for a week or more if *Capnocytophaga* spp or *Actinobacillus* spp are to be detected.

References

1. Ooshima T, Nishiyama N, Hou B, Tamura K, Amano A, Kusumoto A, et al. Occurrence of periodontal bacteria in healthy children: a 2-year longitudinal study. *Community Dent Oral Epidemiol* 2003;**31**:417—25.
2. Nonnemacher C, Mutters R, Flores de Jacoby L. Microbiological characteristics of subgingival microbiota in adult periodontitis, localized juvenile periodontitis and rapidly progressive periodontitis subjects. *Clin Microbiol Infect* 2001;**7**:213—7.
3. Norskov-Lauritsen N, Kilian M. Reclassification of *Actinobacillus actinomy- cetemcomitans, Haemophilus aphrophilus, Haemophilus paraphrophilus and Haemophilus segnis* as *Aggregatibacter actinomycetemcomitans* gen. nov., comb. nov., *Aggregatibacter aphrophilus* comb. nov. and *Aggregatibacter segnis* comb. nov., and amended description of *Aggregatibacter aphrophilus* to include V factor-dependent and V factor-independent isolates. *Int J Syst Evol Microbiol* 2006;**56**:2135—46.
4. Kaplan JB, Schreiner HC, Furgang D, Fine DH. Population structure and genetic diversity of *Actinobacillus actinomycetemcomitans* strains isolated from localized juvenile periodontitis patients. *J Clin Microbiol* 2002;**40**:1181—7.
5. Anne C, Fenelon G, Fenelon L. Unusual infections and novel therapy in the immunocompromised host. *Curr Opin Infect Dis* 2000;**13**:361—6.
6. Bonatti H, Rossboth DW, Nachbaur D, Fille M, Aspöck C, Hend I, et al. A series of infections due to *Capnocytophaga* spp. in immunosuppressed and immunocompetent patients. *Clin Microbiol Infect* 2003;**9**:380—7.
7. Kaplan AH, Weber DJ, Oddone EZ, Perfect JR. Infection due to *Actinobacillus actinomycetemcomitans*: 15 cases and review. *Rev Infect Dis* 1989;**11**:46—63.
8. Parenti DM, Snydman DR. *Capnocytophaga* species: infection in nonimmuno-compromised and immunocompromised hosts. *J Infect Dis* 1985;**151**:140—7.
9. Campbell JR, Edwards MS. *Capnocytophaga* species infection in children. *Pediatr Infect Dis J* 1991;**10**:944—8.
10. Anee JG, Sixous JL, Zohreh TS, Martine BM. Antimicrobial treatment of *Capnocytophaga* infections. *Int J Antimicrob Agents* 2007;**29**:367—73.