

## Case Report

# ***Fusobacterium necrophorum* intratonsillar abscess as a source of bacteremia in a patient with a history of substance abuse**

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### Abstract

A 22-year-old male, with a history of recreational drug use, was admitted with a 24-hour history of sore throat, bilateral otalgia, fever, chills, sweats, and pain in the upper chest. The blood cultures were positive for *Fusobacterium necrophorum*. A thoracic and neck soft tissue computed tomography (CT) scan revealed an intratonsillar abscess and pulmonary septic emboli. Initial treatment with Piperacillin-tazobactam and Clindamycin was de-escalated after 5 days. The patient made a complete recovery after 22 days of antibiotic treatment.

**Key words:** *Fusobacterium necrophorum*; bacteremia; abscess; septic pulmonary emboli; substance abuse.

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### Introduction

*Fusobacterium necrophorum* is an anaerobic Gram-negative bacillus, primarily known for being the causative agent of the invasive disease called Lemierre’s syndrome [1]. Furthermore, the bacterium has been linked to the development of peritonsillar abscesses and otitis media in young children. Recent studies suggest that *F. necrophorum* may also play a role in causing pharyngotonsillitis, particularly in adolescents and young adults, and is now recognized as the second most prevalent bacterial cause of this condition after Group A streptococci (*Streptococcus pyogenes*) [1]. A study utilizing PCR analysis revealed that *F. necrophorum* was present in throat swabs of 21% of healthy young adults, but it might be insufficient evidence to suggest that is a typical component of oral microbiota and it seems probable that is an exogenously acquired infection [2]. *Fusobacterium* spp. bacteremia is uncommon, with previously reported incidence rates of 1.5-3.7 cases/million/year [3–5], and has been correlated with a variety of clinical presentations. Serious infection tends to commonly affect young, otherwise healthy adults [6]. Clinical presentation is commonly similar to *Streptococcus pyogenes* (Group A Streptococcal [GAS]) with a sore throat as the initial symptom. This case presentation aims to highlight the clinical aspects,

diagnosis, and management of a 22-year-old male patient with *F. necrophorum* bacteremia, associated with an intratonsillar abscess and pulmonary septic emboli. It emphasizes the importance of early recognition and appropriate antibiotic therapy to prevent potentially fatal outcomes.

### Case presentation

A previously healthy 22-year-old male patient with a history of recreational drug use (cocaine and marijuana), presented to the emergency department of National Institute of Infectious Disease “Prof. Dr. Matei Bals” with a 24-hour history of sore throat, bilateral otalgia, fever, chills and anterior thoracic pain accentuated by breathing. Prior to this presentation, he had a similar episode two weeks ago, which was treated with amoxicillin for five days with symptoms regression.

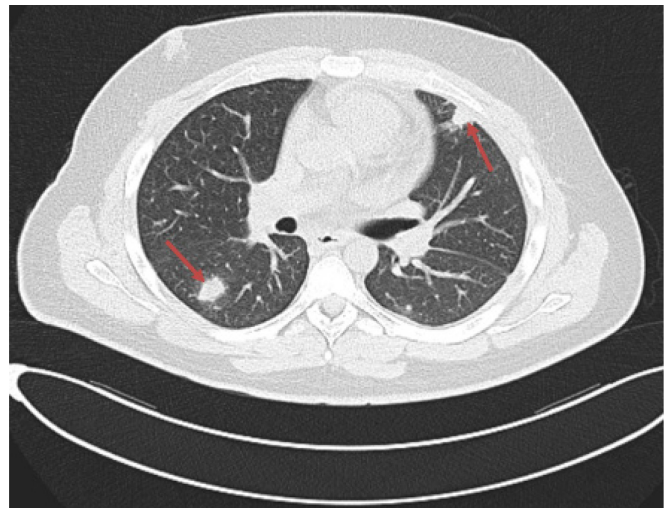
Clinical examination revealed fatigue, fever (39 °C), low blood pressure 92/52mmHg, tachycardia 100/bpm, pale, wet skin, hyperemic pharynx with a slight ulceration on the superior pole of the right tonsil, signs of poor oral hygiene, anterior chest pain, and normal cardiac and pulmonary auscultation. Laboratory findings revealed a white cell count of 15,700 cell/mmc (neutrophils 14340 cell/mmc), lymphopenia (450cell/mmc), severe thrombocytopenia (75,000

cell/mmc), elevated C-reactive protein 338 mg/L, procalcitonin 23.2 µg/L and D-dimer 10× normal value. Rapid antigen detection tests for Group A Streptococci and ASLO were negative. Chest X-ray was normal, but thoracic and neck soft tissue computed tomography (CT) scan showed an intratonsillar abscess (Figure 1), pulmonary septic emboli (Figure 2), and no thrombosis in the examined territory.

Three sets of blood cultures (aerobic and anaerobic bottles) were collected from 3 different puncture sites and sent to the Bacteriology laboratory in the first 60 minutes of admission. After 26 hours of incubation in the BioMérieux BacT/Alert 3D automated system, all 3 anaerobic bottles are positive. Gram and methylene blue-stained smears were performed and Gram-negative bacilli were observed isolated and in clumps (Figure 3). Using a multiplex PCR molecular blood culture identification system (BioFire FilmArray, BioMérieux, Salt Lake City, Utah) the result was "Not Detected". Columbia blood agar media with 5% sheep blood and chocolate agar were inoculated according to laboratory protocol under both aerobic and anaerobic conditions. After 24 hours at 37 °C, bacterial growth was obtained on 5% sheep blood Columbia blood agar medium, characterized by non-hemolytic, smooth-surfaced, grayish-gray, slightly nipped colonies and

white colonies on chocolate agar medium (Figure 4), with irregular borders on both culture media. Identification was performed in the automated matrix assisted laser desorption ionization (MALDI) TOF MS (Bruker, Billerica, Massachusetts) with a score above 2.00, resulting *Fusobacterium necrophorum*. Antibiotic resistance was tested using the MIC method on Mueller-Hinton with 5% sheep blood agar medium to penicillin, meropenem, metronidazole, and clindamycin. Results were interpreted according to EUCAST clinical breakpoints, version 13.0 (January 2023). The pathogen was susceptible to all antibiotics tested.

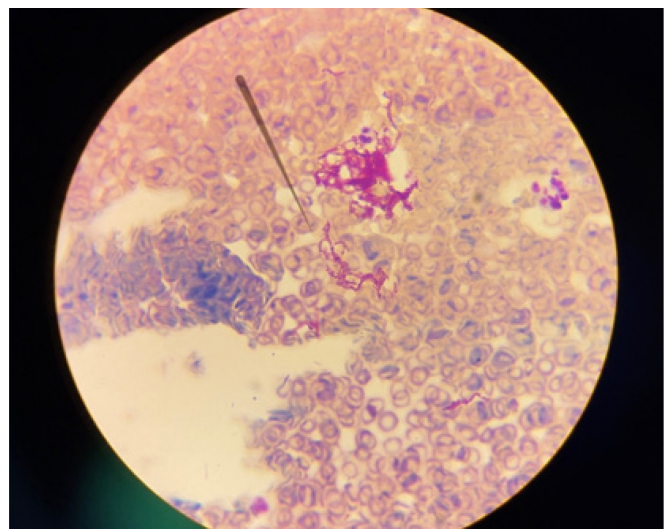
**Figure 2.** Areas of alveolar and interstitial consolidation of pneumonic type with non-systematic distribution in both lung fields.



**Figure 1.** Asymmetry of the pharyngeal tonsils, due to the increased volume of the right one. A nodular image with an approximate 2 cm and densities suggestive of an abscess is evident.



**Figure 3.** Gram-negative bacilli in clumps, viewed under 1000x magnification, Gram stain



Two swabs from the surface of the tonsillar abscess were also sent to the National Institute of Infectious Disease “Prof. Dr. Matei Bals” Bacteriology Laboratory for further testing. Gram stains showed frequent polymorphonuclear leukocytes, rare Gram-negative bacilli and Gram-positive cocci. There was no relevant growth on blood agar and chocolate agar plates.

Treatment options were discussed with the otolaryngologist physician and it was decided to trial conservative management. Empirical intravenous antibiotic therapy was started, with Piperacillin-tazobactam and Clindamycin. When *F. necrophorum* was isolated and the antimicrobial susceptibility test was available, the Piperacillin-tazobactam was replaced with Ampicillin i.v. Also, the patient received corticosteroids from the second day of admission, for a total of 3 days, and prophylactic anticoagulation during the hospital stay. On day 5 of admission, the patient became afebrile. The follow-up CT scan performed 10 days after the initial one, showed that the abscess diminished significantly with no further pulmonary involvement. The treatment recommendation upon patient discharge was to continue Clindamycin for another 10 days, adding to a total of 22 days of antibiotic treatment.

On subsequent outpatient follow-up, after 60 days, the patient showed an excellent recovery.

## Discussion

Oropharyngeal infections are a frequent clinical syndrome usually caused by viruses and less commonly caused by bacteria. Bacterial tonsillitis is due most often to streptococci and occasionally to anaerobic microorganisms; it is seldom associated with severe disease or accompanied by bacteremia [7].

Recent decades have seen an increase in anaerobic infections and bacteremia. It seems that we are witnessing a reemergence of anaerobic bacteremia as a significant clinical problem. There is published evidence that the shift to anaerobe, e.g., *F. necrophorum*, etiology of the peritonsillar abscess is the most prevalent in Denmark [8]. A variety of sources may contribute, especially in immunocompromised patients and those with complex underlying medical conditions. This could also be explained by an increase in sensitivity for anaerobic bacteria detection methods following the use of better-developed protocols and the modernization of bacteriology laboratories [9].

The gastrointestinal tract, genitourinary tract, and oral cavity are all home to the anaerobic, non-spore-forming Gram-negative rod known as *Fusobacterium*.

**Figure 4. A:** *Fusobacterium necrophorum* colonies on blood agar; **B:** *Fusobacterium necrophorum* colonies on chocolate agar



*F. necrophorum* is divided into two subspecies: *F. necrophorum* subsp. *necrophorum*, and *F. necrophorum* subsp. *funduliforme*. The *necrophorum* subspecies is associated mostly with infections in domestic mammals, whereas subsp. *funduliforme* infects mainly humans [11,13]. The most clinically relevant *F. necrophorum* tends to appear more in male patients of less than 40 years of age and associated with head and neck infections [11]. *F. necrophorum* rarely penetrates intact mucosal surfaces [11]. It has been suggested that transient infection-associated mucosal and systemic immunosuppression may contribute to pathogenesis [11]. Insufficient research exists in the available literature regarding the association between cocaine use and an elevated risk of developing bacteremia caused by pathogens responsible for less severe infections. Nonetheless, reported cases indicate that prolonged cocaine use can disrupt the immune system, rendering individuals more susceptible to infectious diseases and accelerating their progression. This heightened vulnerability extends to other medical complications, such as cardiovascular and cerebrovascular disorders [12]. Notably, the practice of intranasal cocaine use, commonly known as snorting, has been linked to specific nasal complications, including intranasal viral warts (snorter's warts), nasal and perinasal crusts, epistaxis, and asymmetry of the nostrils [13]. Additionally, drug induced vasoconstriction may result in ischemic necrosis of nasal cartilages, and long-term use can lead to nasal septal perforation and oropharyngeal ulceration [14]



This, in turn, can facilitate bacterial passage throughout the body.

Bacteremia and pulmonary involvement with *F. necrophorum* may occur within several days to several weeks from the onset of pharyngeal symptoms [2]. Therefore, the patient's progression with two episodes in a relatively short interval (2 weeks) may represent one episode, with the symptom-free period determined by the time required for the abscess formation and the initial antibiotic treatment [15].

Diagnosis of *F. necrophorum* bacteremia relies on an astute clinical suspicion, and appropriate laboratory tests. Blood cultures are the gold standard for diagnosing bacteremia and molecular methods, such as PCR, can be used for faster bacterial identification and parallel confirmation. Due to the elevated occurrence of thrombotic complications and abscess formation, imaging should be taken into account for all infections caused by *Fusobacterium* spp originating from the upper respiratory tract or head region. In the case of Lemierre's syndrome, thoracic CT findings can be quite characteristic including lobar consolidation, pleural effusion, and multiple peripheral pulmonary nodules [16]. The lungs are the most common site of septic foci with an incidence greater than 80% in some case series [16].

## Conclusions

In conclusion, *Fusobacterium necrophorum* bacteremia is a rare but potentially life-threatening infection that can lead to septicemia and sepsis. Prompt diagnosis and appropriate treatment with antimicrobial agents are essential to prevent complications and improve outcomes. A high index of suspicion is necessary for young adults with a history of pharyngitis or tonsillitis who present with non-specific symptoms of fever, chills, and malaise.

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