DEEP NECK ABSCESSES COMPLICATING ACUTE FUSOBACTERIAL TONSILLITIS

***Elisabeth Hui Ling Lee, Willem Lodewijk Manson**

Department of Medical Microbiology, University of Groningen, University Medical Center Groningen, Groningen, the Netherlands
**Correspondence to h.l.lee@online.nl*

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ABSTRACT

A case of deep neck abscesses due to *Fusobacterium necrophorum* in a young adult patient after therapy with phenethicillin is reported. The clinical manifestations, diagnostic methods, therapy, and outcome are described.

Keywords: Deep neck abscesses, *Fusobacterium necrophorum,* phenethicillin, amoxicillin/clavulanic acid.

INTRODUCTION

Deep neck suppurative inflammation is rarely encountered in the post-antibiotic era, but is the major life-threatening complication after throat infection.[1] It is characterised by a sore throat with fever, and painful swelling in the neck region caused by bacterial infection, most commonly by the commensal oropharyngeal flora. A multidisciplinary approach including surgical drainage in addition to intravenous antibiotic treatment is required. The prognosis is usually favourable, provided that the condition is recognised early. This report presents a case of an adult patient with peritonsillar abscess involvement of the parapharyngeal, submandibular, and retromandibular regions due to infection with *Fusobacterium necrophorum* after phenethicillin (phenoxyethylpenicillin) therapy.

CASE REPORT

A 23-year-old male presented to the emergency department with a sore throat and a painful swelling in his neck. For 5 days prior to admission the patient had experienced increasing swelling in the left side of his neck and pain when swallowing. He also had a fever, as well as difficulty in eating and drinking, as it was difficult for him to open his mouth. He had been receiving phenethicillin potassium 500 mg four times a day for 1 week, but the symptoms continued to worsen. Previous medical history recorded various interventions in the ear, nose, and throat area: a median palatoschisis and a Langenbeck palatorrhaphy in 1983, bilateral grommets insertion in 1990, and an adenoidectomy and pharyngoplasty in 1998. He had no prior history of tonsillitis.

Upon physical examination, the patient was found to have a blood pressure of 110/70 mmHg, a pulse rate of 80 beats/min, a temperature of 38.8°C, and no chills. There was a swelling in the neck measuring 4 x 5 cm in region II left. On palpation this was found to be a painful, large, fixed, elastic mass without fluctuations. Trismus with a mouth opening of 2 cm was noted. There were normal heart and breath sounds without adventitious sounds during auscultation. The abdomen was supple and without liver and spleen enlargement.

Oropharyngeal examination revealed bilateral tonsillar swelling with whitish yellow exudate. The left tonsil was larger than the right one. Evidence of a pharyngoplasty was visible in the throat. Flexible endoscopy revealed symmetrical movements of both halves of the larynx, and the lumen was not constricted. Laboratory findings showed a high white cell count of 21.1 x 10^9/l and a high C-reactive protein concentration of 343 mg/l. Levels of haemoglobin, electrolytes, liver enzymes, blood urea nitrogen, and creatinine were

within normal ranges. The monosticon test for the detection of heterophile antibodies was negative.

Given the elevated inflammatory parameters, together with the clinical picture, a parapharyngeal abscess was considered to be the most likely diagnosis. A chest radiograph was performed and the result showed clear lung fields. A neck computed tomography (CT) scan was carried out and showed an extensive abscess collection in the left submandibular and retromandibular spaces, extending from the tonsil. The left internal jugular vein was not thrombosed. As a final, supplementary examination, a panoramic radiograph (OPG) was taken in an effort to trace the source of the abscess. No dentogenic focus was documented. A left tonsillectomy was carried out together with drainage of the parapharyngeal abscess. The surgery went without complications. Phenethicillin was replaced by a combination of amoxicillin 1,000 mg and clavulanic acid 200 mg intravenously every 8 hours. The remaining clinical course was characterised by improvement.

The excised tonsil was sent for histological examination and the result was acute tonsillitis with no distinguishing characteristics. The pus was sent for culture and the Gram stain preparation was found to contain large numbers of leukocytes, moderately Gram-positive rods, and weakly Gram-negative rods. Colonies were grown on Brucella blood agar (Oxoid) and after 48 hours of incubation indicated anaerobic Gram-negative rods, with *Fusobacterium* spp. as the suspected agents. Attempts at phenotypic identification were unable to distinguish between the various species of the *Fusobacterium* genus and therefore a 16S ribosomal RNA (rRNA) sequence test was carried out. The isolate was confirmed as *F. necrophorum.* In addition, antimicrobial susceptibility testing was conducted according to guidelines established in 2014 by the European Committee on Antimicrobial Susceptibility Testing (EUCAST)[2] and confirmed that this microorganism was susceptible to penicillin.

DISCUSSION

F. necrophorum is an obligate anaerobic Gram-negative rod, and a microorganism resident in the human oral cavity. It was previously known as *Bacillus funduliformis, Bacteroides funduliformis, Sphaerophorus necrophorus,* and *Bacteroides necrophorus.*[3] It has been usually associated with Lemierre's syndrome (LS), septic internal jugular vein thrombosis, and disseminated metastatic abscesses in various organ systems, all preceded by a throat infection.[4] After Group A streptococci, *F. necrophorum* is the most common causative agent of peritonsillar abscess and recurrent throat infection.[5] In the current case, the patient had no past medical history of recurrent tonsillitis, but he had various interventions in the oropharyngeal area, which could be a predisposing factor for *F. necrophorum* infection. These procedures, usually performed during infancy, could impact negatively even after so many years and may imply an important role for innate immunity, although further studies are needed to confirm this.

Given the nature of *F. necrophorum,* the laboratory diagnosis of infection with this microorganism can be challenging. Analysis of the 16S rRNA sequence is a 'gold standard' molecular technique for identifying this species. However, matrix-assisted laser desorption ionisation time-of-flight mass spectrometry is now available, which makes it easier and cheaper to identify this species.[6]

The Dutch College of General Practitioners[7] and the Dutch Working Party on Antibiotic Policy[8] recommend that phenethicillin be administered as a first-line antibiotic for tonsillitis. Phenethicillin is the first semisynthetic penicillin with a narrow spectrum of antibacterial activity similar to that of penicillin G.[9] In an *in vitro* test, penicillin G had lower inhibitory activity than amoxicillin against clinical isolates of *F. necrophorum.*[10] Given the increasing prevalence of beta-lactamase-producing *F. necrophorum,* however, amoxicillin is no longer effective. In this case, preference is given to amoxicillin/clavulanic acid treatment. In the current case, the pathogen appeared sensitive to penicillin *in vitro,* yet an abscess still developed. The microbiological basis for phenethicillin treatment failure is not known. It seems to be more likely to occur in the setting of high bacterial burdens and low tissue permeability, leading to abscess formation.

In patients who are allergic to penicillin, other antimicrobial agents (e.g. clindamycin, azithromycin, metronidazole, and tetracycline) may serve as an alternative.[11,12] However, resistance to these regimens among *F. necrophorum* has been reported.[11] Notably, among tetracyclines, tigecycline seems to possess the greatest activity against *Fusobacterium* spp.[12]

The differential diagnosis of a sore throat with fever and swelling in the neck space may indicate

LS and Epstein–Barr virus (EBV) infection, especially in young adults. In this patient, a neck CT scan revealed no thrombophlebitis of the internal jugular vein, thus ruling out LS. Infectious mononucleosis could be ruled out too with a normal liver-function test and negative monosticon result. This test is less sensitive than the currently available serological test for antibodies specific for EBV antigens. However, the enzyme-linked immunoassay method is not available in all laboratories. Lastly, the possibility of Ludwig's angina should be considered, but this almost never occurs in combination with pharyngitis, in which a purulent inflammation fills various spaces in the submandibular region, caused by dental abscesses.[13] No dental focus was observed in the OPG, which meant that the possibility of Ludwig's angina could be eliminated.

In conclusion, an individual who has undergone various interventions in the oropharyngeal area may be more likely to suffer *F. necrophorum* throat infection. However, a further study is required to confirm this hypothesis. Clinicians prescribing phenethicillin to treat throat infection should be aware of the possibility of deep neck abscesses, and a change in therapy is indicated if there is no evidence of clinical improvement. A combination of amoxicillin and clavulanic acid should be considered when choosing initial empiric therapy for this group of patients.

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