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Case Report

Repetitive urinary tract infections and two prostatic masses: Prostatic soft tissue infection with *Actinomyces neuii*

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ABSTRACT

Actinomyces infection is a tissue destructive, low-grade infection that often resembles malignancy. We report the case of a 70-year-old male with repeated, culture-negative urinary tract infections while intermittently catheterized. At presentation, the patient reported a new episode of urinary tract infection with white discharge in his urine. Transrectal ultrasonography showed two lesions in the prostate, suspect for prostate cancer. However, biopsy did not show cancer, and anaerobic culture grew *Actinomyces neuii*. A 3-month antibiotic course of amoxicillin eventually cured the infection. This is a case of prostatic soft tissue infection with *A. neuii*. It is important to consider *Actinomyces* infection in patients with a non-malignant prostatic mass. Although β-lactam antibiotics do not penetrate the prostate well, the *Actinomyces* infection was cured by prolonged amoxicillin treatment in this case. It is possible that the tissue damage enhanced the amoxicillin concentration in the infected prostate.

Introduction

Actinomyces is an anaerobic or microaerophilic bacterium causing slowly progressive infections at numerous sites. After disruption of the mucosal barrier, *Actinomyces* can invade virtually all tissues. The densely fibrotic *Actinomyces* lesions cause tissue destruction with low-grade inflammation, thereby leading to a chronic disease course. This infection may resemble malignant disease. Pelvic soft tissue infection associated with an intrauterine contraceptive device is a well-known form of this infection.

Long-term treatment with β-lactam antibiotics is mandatory. Sometimes, surgical resection of the infected tissue may contribute to cure (Wong et al., 2011).

Here we describe the case of a patient with an *Actinomyces neuii* infection in the prostate and the difficulties in defining the optimal treatment regimen.

Case report

A 70-year-old male with a history of intermittent self-catheterization for an atonic bladder and a non-invasive papillary Ta urothelial carcinoma of the bladder since 2012, presented to the infectious diseases outpatient clinic with a relapse of an urinary tract infection (UTI) in August 2012.

Months before presentation he had suffered from repetitive UTIs, for which he had been treated empirically with short courses of antibiotics. A causative agent was cultured in only a minority of these events. However, at presentation, when the patient was without complaints, short branching gram-positive rods were found to be present in the urine. Colonies on aerobic blood agar medium were identified as *A. neuii* by Bruker matrix-assisted laser desorption/ionization time-of-flight mass spectrometry (MALDI-TOF) (de Vreese and Verhaegen, 2013). At that time, the clinical significance of this finding was unclear due to the absence of leucocyturia and the unexpected bacterium identified.

In April 2013, the patient reported a new episode of mild abdominal discomfort and cloudy urine mixed with a white discharge in the catheter. He had no fever. The patient recognized these symptoms from previous UTIs. Leucocytes and *Enterococcus faecalis* were present in the urine, and *A. neuii* was detected again, as described above. The Etest for antimicrobial susceptibility testing determined the *A. neuii* to be susceptible to penicillin and amoxicillin. A short course of amoxicillin was given.

The white discharge in the urine, the recent history of multiple culture-negative UTIs, and the repeatedly cultured *A. neuii* raised the suspicion of *Actinomyces* prostatic soft tissue infection.

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Transrectal ultrasonography of the prostate showed two small hypo-echogenic lesions in the prostate. Histological examination showed neither prostate cancer nor (granulomatous) inflammation. Sulphur granules were absent. Colonies on anaerobic blood agar (Figure 1) were identified as *A. neuii* by Bruker MALDI-TOF. In addition, *Prevotella spp*, *Bacteroides uniformis*, and *Bacteroides vulgatus* were identified in these lesions.

The first course of amoxicillin — 1 g five times a day for 5 weeks — resulted in a relapse shortly after discontinuation. Three months of amoxicillin at a dose of 500 mg five times a day eventually cured the infection. During 4 years of follow-up, the *Actinomyces* infection did not recur.

Discussion

On brief review of the literature, it appears that five previous cases of *Actinomyces* prostatic soft tissue infection have been described (Liedana et al., 1979; de Souza et al., 1985; Funke and von Graevenitz, 1995; Chemsi et al., 2007). *A. neuii* does not cause classical actinomycosis but is the causative agent of (soft) tissue infections, e.g. skin infections including infected atheromas, abscesses, or prosthetic device infections (von Graevenitz, 2011).

This rare infection was cured with prolonged amoxicillin therapy. Penicillin derivatives are the best treatment for *Actinomyces* infections (Russo, 2010; Barberis et al., 2017), but the effectiveness of β-lactam therapy in prostatic infections is disputable.

Concentrations of β-lactam antibiotics in prostatic tissue are low during treatment. This is due to the reduced passive transport of β-lactam antibiotics over the vascular–prostate barrier. The poor lipid solubility and ionized status hamper adequate penetration into the prostatic tissue (Charalabopoulos et al., 2003).

It is hypothesized that the disrupted prostatic mucosal barrier and the ongoing tissue destruction by *Actinomyces* infection could have enabled adequate amoxicillin drug levels in the prostatic tissue in the case presented here. With limited protein binding and amoxicillin being excreted primarily in the urine (el Walily et al., 1992), extremely high urine concentrations of amoxicillin would be achieved (Fraschini et al., 1990). The majority of the 2.5 g/day amoxicillin that this patient used during the final treatment period was excreted in his daily 1–2 litres of urine.

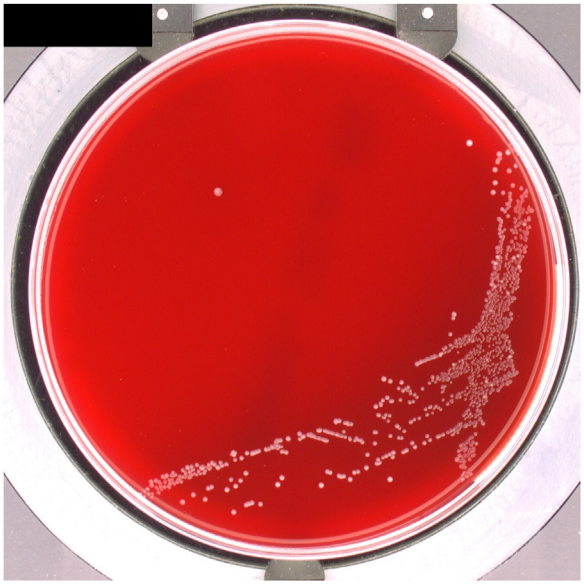

Figure 1. Growth of *Actinomyces neuii* day 3 on anaerobic blood agar plate.

Both the disrupted prostatic mucosal barrier and the high urine concentrations of amoxicillin cured the *Actinomyces* prostatic soft tissue infection after a prolonged treatment course.

Due to his urothelial carcinoma, this patient had undergone eight cystoscopies between February 2012 and the moment of the final diagnosis of the *Actinomyces* prostatic soft tissue infection. The possibility of a healthcare-associated infection due to contaminated cystoscopy equipment was investigated, but no identical *A. neuii* infections after urological procedures in the hospital were identified.

In patients with recurrent culture-negative UTIs (with white discharge) or in patients with cancer-negative prostatic lesions, *Actinomyces* prostatic soft tissue infection should be considered. Prolonged treatment with amoxicillin can cure this infection.

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Ethical approval

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Conflict of interest

The authors have no conflicts of interest.

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