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Acute Suppurative Abscess Caused by *Actinotignum schaalii*

Edward Ager*, Maha Soliman, Jude Abadie

Department of Pathology, Texas Tech Health, El Paso, USA
Email: *eager@ttep.edu

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Abstract

Actinotignum schaalii is a pathogen that has been generally associated with urinary tract infections. Here we report a finding of *A. schaalii* found in a specimen from the drainage of a neck abscess in a 49-year-old male who was initially seen for a post-surgical follow-up visit for a surgical procedure on his foot. A gram-positive bacteria was isolated from drainage taken from the neck abscess and then characterized by Bruker MALDI-TOF mass spectrometry. As is consistent with other reports, this fastidious bacteria was an unexpected finding and was likely a causative pathogen that could have been missed using traditional microbiology laboratory testing procedures not incorporating the Bruker MALDI-TOF.

Keywords

Neck Abscess, Bruker MALDI-TOF, Gram Positive Coccobacillus, Facultative Anaerobe, *Actinotignum schaalii*, *Actinobaculum schaalii*

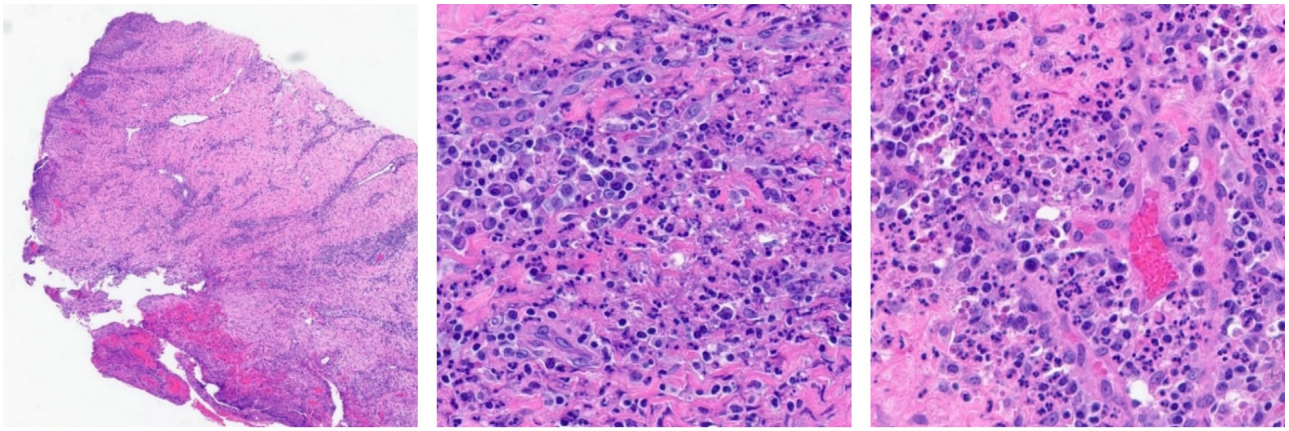
1. Introduction

Actinotignum schaalii is a gram positive bacilli first described in 1997 [1] which has been primarily responsible for genitourinary tract infections mainly in elderly patients and others with underlying urological conditions [2]. This organism, formerly described as *Actinobaculum schaalii* may be highly under reported due to the infrequency of the performance of urine gram stains and also the likelihood that the appearance of gram positive rods in a urine culture may be presumptively called *Corynebacterium* or *Lactobacillus species* [3]. It has also been described as a commensal of the urogenital area [4].

Based on the published literature, *A. schaalii* may be an under-reported etiological pathogen from various sources to include skin and soft tissue abscesses.

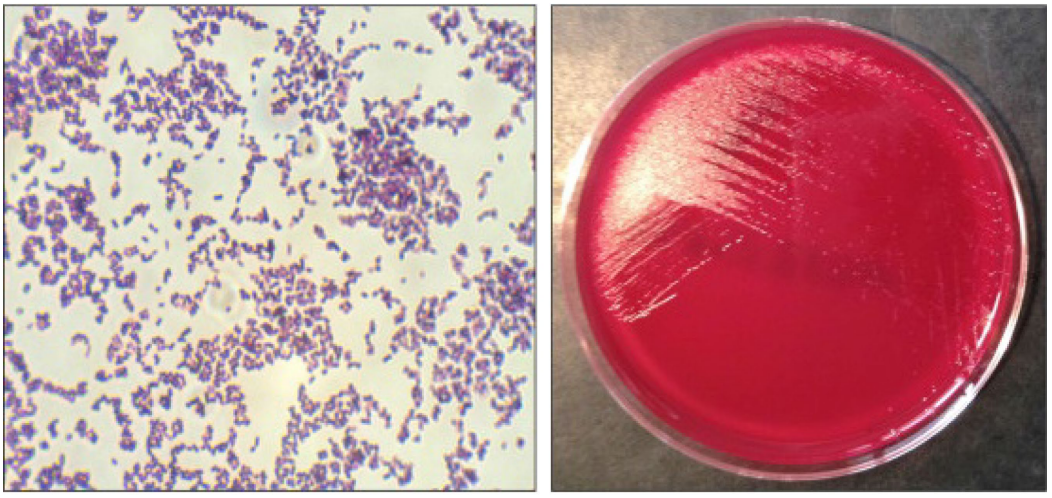
However, improving methods for microbiological identification, including the MALDI-TOF are contributing to increased reports of isolation. The literature associated with this pathogen also described elevated resistance patterns including reports of the necessity for extended courses of antimicrobial treatment adding to further concern for the accurate identification and crucial need for the susceptibility testing to avoid treatment failures.

2. Case: Acute Suppurative Abscess Caused by *Actinotignum schaalii*



(a) (b) (c)

Figure 1. Biopsy of Left neck abscess. (a) Low power view showing partially ulcerated epidermis with infiltration of the dermis and subcutaneous tissue by mixed acute and chronic inflammatory cells consistent with soft tissue abscess. (H&E x4); (b) & (c) High power view showing mixed acute and chronic inflammatory cells with excess number of neutrophils (H&E, 40x). Pictures by Maha Soliman MD.



(a) (b)

Figure 2. (a) & (b) Gram stain and colony morphology of *A. schaalii*. (a) & (b) Gram staining (original magnification, ×1000) showing Gram-positive coccoid rods. (b) Colonial morphology of *Actinotignum schaalii* grown on Columbia agar with 5% sheep's blood after 72 hours of incubation under anaerobic conditions at 37˚C. Reproduced from Lotte R, Lotte L and Ruimy R. *Clinical Microbiology and Infection*, 2015; 22, 28 - 36 with permission.

In this report, a 49-year-old male was seen for follow-up treatment of a right foot wound. His clinical history was notable for diabetes, chronic kidney disease, as well as a seven-year history of a recurrent neck wound that "gets large and bursts". During his initial visit, he complained about the abscess on the left side of his neck below the masseter muscle. He describes no fever, chills, night sweats or pain. There is no hematuria or chest pain. Subsequently, the attending practitioner obtained a percutaneous specimen from drainage of the left neck subcutaneous tissue and fascia. The contents were described as "dishwater drainage" using. The specimen was submitted to the microbiology laboratory for routine wound culture, as well as for histopathology. After 72 hours, cultures showed minimal growth of a gram positive fastidious, facultative anaerobic coccobacillus, identified as *Actinotignum schaalii by* Bruker matrix-assisted laser desorption/ionization time-of-flight (MALDI-TOF, Beckton Dickinson). No other organisms were isolated. No further testing was performed on the isolate to include susceptibilities. Instead, the patient was treated empirically with Doxycline. The patient returned eight months later with recurrence of the same complaint.

In this case report, a 49-year-old man with a history of type 2 diabetes sought care as part of a planned follow-up to monitor post-surgical management for his left foot. During this visit, an abscess on his left side facia of the neck was identified, and fluid from the abscess was sent for microbiology and histology studies (**Figure 1**). The source of the infection was recovered after 72-hours on culture, and the bacterial identity was determined using the Bruker MALDI-TOF. The isolate showed colony morphology and gram stain characteristics as indicated in **Figure 2**.

3. Discussion

In our case, a gram-positive coccobacilli was recovered on solid media as pure and predominant growth from the biopsied specimen and identified as *Actinotignum schaalii* by MALDI-TOF mass spectrometry. As such, the recovered isolate showed characteristics consistent with published reports. As shown in this case, *A. schaalii* may represent an under recognized pathogen in abscess and skin and soft tissue infections.

Previous reports have debated whether this gram-positive coccobacilli may be an invasive pathogen or a commensal [5]. With the near universal implementation of matrix-assisted laser desorption/ionization time-of-flight (MALDI-TOF), clinical microbiology laboratory has seen the increased identification of many formerly rarely described pathogens, including *A. schaalii,* as probable etiological agents in cases of infections from many sources such as skin and soft tissues, abscesses, blood cultures, and genitourinary tract infections.

One such study showed a statistically significant increase in identification from 1.8 to 6.8 cases per million occurrences [6]. The MALDI-TOF was also described as a beneficial tool in the identification of *A. schaalii* by Tuuminen T, Suomala P, Harju I. [7] and Lotte R, Lotte L, Ruimy R [8]. Several studies have been performed

using in-house retrospective data including reports by Prigent G, Perillaud C, Amara M, Coutard A, Blanc C, Pangon B [9] and Lieu A, Mah J, Peirano G, Somayaji R, Church D [10]. In the first report 24 isolates were collected from July 2004 until February 2015 at Centre Hospitalier de Versailles (CH Versailles (France)) both before and after implementing MALDI-TOF. The impact was 3-fold increase of recovery from 6 to 18. This report also noted that *A. schaalii* was recovered in abscess as well as urines and blood specimens. In the latter report, the authors reported that prior to the inclusion of *A.schaalii* in the MALDI-TOF database, 100% of isolates were discordant compared to 16S RNA sequencing. Once the library was updated there was 100% agreement between the MALDI-TOF and sequencing.

Another study conducted in Greece looked at eleven cases across a six year period in which nine out of 10 cases of *A. schaalii* involved pus cultures and two cases indicated isolation from bone [11]. The retrospective study by Tschudin-Sutter S, Frei R, Weisser M, Goldenberg D, Widmer AF [5], looked at 40 isolates of *A. schaalii* taken from urine (12), blood (21) and biopsy specimens (7) from 27 patients. Based on the cases reviewed it was concluded that this organism was associated with a true infection and thereby not an "innocent bystander".

Most cases in which *A. schaalii* has been recovered were associated with urinary tract infections [12]-[15]. There are several accounts of finding of *A. schaalii* in bacteremias as well but abscess infections associated with *A. schaalii* have usually implicated a source in close proximity to the genitourinary tract [3] [11].

Other case reports documenting a finding of *A. schaalii* in abscess cultures not associated with an origin from a genitourinary source are rare. Authors Tena D, Fernández C, Lago MR, Arias M, Medina MJ, Sáez-Nieto JA described two cases the first involving a patient with cellulitis and an inguinal abscess, the second patient with a pilonidal abscess [16]. Authors Panganiban CM and Gupta S., reported a case in which a patient with common variable immunodeficiency (CVID) presented with cellulitis and an abscess of the abdomen from which *A. schaalii* was deemed to be the etiological pathogen [17]. Kus NJ, Kim BJ, Ross HM [18], described a case of necrotizing fasciitis in an eighty-four-year old patient from which *A. schaalii* and *Actinomyces euoropeus* were isolated. Haller, P., Bruderer, T., Schaeren, S. described a case of vertebral osteomyelitis caused by *A. schaalii* [19]. And in another report, *A. Schaalii* was implicated as the cause of Fournier's gangrene in a thirty-three-year-old male with co-morbidities [20].

Our current case report adds to the literature and reinforces the importance of the recognition of *A. schaalii* as true pathogen in abscess related infections and the importance of full characterization of this organism when isolated. The obstacles in recovering this fastidious bacterium are well documented. This is particularly difficult in urine cultures. When this bacterium is recovered in anaerobic cultures, it is recommended that the isolate should be fully characterized so as to provide not only nomenclature, but susceptibility information based on published reports of intrinsic resistance. Standardized *A. schaalii* breakpoints are not avail-

able from the Clinical Laboratory Standards Institute (CLSI), but, various reports include testing for various antibacterial drugs, including the reports by Cattoir [2] and Susquillo-Arce [21] in which MICs of amoxicillin, ceftriaxone, gentamicin, vancomycin, clindamycin, linezolid, ciprofloxacin, levofloxacin, moxifloxacin, co-trimoxazole, nitrofurantoin, and metronidazole were determined using the E-test method. The latter report also describes *A. schaalii* susceptibility data which showed significant resistance to erythromycin (46.8%), clindamycin (47.7%) and ciprofloxacin (100%). There has also been observation of treatment failure with Amoxicillin (500 mg, three times daily) possibly necessitating longer courses of treatment [21]. The difficulties in identifying this pathogen has been estimated to delay treatment by an average of 2.8 days [15].

In our case, susceptibilities were not requested and hence not performed and therefore further limit the information we can present for this case. Additionally, 16S sequencing is rarely requested in our institution thereby contributing to the limitations of this study and potential patient outcomes.

As more information about this bacterial species is reported, evidence further supports the potential that this bacterium is a direct source of morbidity and mortality in various sources of infection. Furthermore, *A. schaalii* may be a good candidate for inclusion in emergent molecular assays that target bacteria that are described as difficult to culture and are potential sources varied infections.

4. Conclusion

This case report describes the finding of *A. schaalii* in a specimen taken from a left neck abscess of a 49-year-old with comorbidities. *A. schaalii* has been reported from various specimens but primarily associated with genitourinary tract infections and has also been described as an overlooked pathogen or as a probable contaminant in mixed infections. We present this case as evidence to support this organism as a potentially overlooked cause of abscess formation and further document the difficulty in isolating this organism and the importance of the emerging role the MALDI-TOF plays in characterization of *A. schaalii*. Because sequencing information is inconsistently applied to clinical microbiology isolates, the MALDI-TOF identification is heavily relied upon and for findings of rare bacteria with intrinsic resistance patterns this is of substantial importance. As noted previously, the patient returned with recurrence of the abscess several months later. However, it appears treatment in both instances was limited to empiric administration of ceftriaxone and sulfamethoxazole-trimethoprim (Bactrim), as no susceptibilities were requested on either visit. Diagnosis was supported by the expression of cystic fluid after visualization by CT scan. The results of microbial cultures submitted on this occasion showed mixed morphologies described as probable contamination with *Actinomyces radingae* reported after analysis using the Bruker MALDI-TOF. Actinomyces species are consistently seen in our laboratory, whereas this report documents the only finding of *A. schaalii* in our laboratory to date.

Ethics Statement

Ethical approval was not required for this single case report according to local regulations. Permissions. Rights to the reproduction of Figure 2 were obtained through Rights Link. License #6307220352421.

Author Statement

This manuscript has not been published and is not under consideration for publication elsewhere. Additionally, all authors have approved the contents of this paper and have agreed to the journal's submission policies.

Author Contributions

Dr Ager and Dr Abadie provided the original writing of this manuscript and Dr Soliman contributed to the histology and review of the case.

Conflicts of Interest

All authors report no conflicts of interest relevant to this article.

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