

Case Report

Umbilical abscess caused by *Helcococcus kunzii*: a case report and literature review

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Abstract

Introduction: *Helcococcus kunzii* is a commensal bacterium found in the human skin that seldom causes infection. While there is documentation of abscesses; such as foot, breast, and brain abscesses; caused by *H. kunzii*, there are no reports of its causing umbilical abscesses.

Case presentation: A case of scar tissue infection caused by *H. kunzii* in a diabetic patient is described. A single pathogen was isolated from a culture of the abscess extract and was identified as *H. kunzii* using matrix-assisted laser desorption/ionization-time of flight (MALDI-TOF) and 16S rRNA gene analysis. The patient was treated with a 5-day course of cefazolin for anti-infection, and after discharge from the hospital, was transferred to outpatient dressings.

Conclusions: Cefazolin has potential as a potent antimicrobial agent against *H. kunzii*. This report provides a viable treatment option for *H. kunzii* infections.

Key words: *Helcococcus kunzii*; abscess; MALDI-TOF; 16S rRNA; cefazolin.

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Introduction

Helcococcus kunzii is a Gram-positive, facultatively anaerobic species that was first identified as a commensal on human skin [1]. It is spherical in appearance and is classified within the "Streptococcus-like bacteria" group [2]. While the identification of this bacterium was difficult in the past, the widespread use of matrix-assisted laser desorption/ionization-time of flight (MALDI-TOF) and sequencing techniques for bacterial identification has led to reports of more cases. Recent reports suggest that invasive infections resulting from *H. kunzii* can manifest in various anatomical locations, including foot abscesses [3], joint infections [4], bacteremia [5], and breast abscesses [6]. However, more consensus is needed concerning the most appropriate treatment regimen for these infections. Thus, further research is necessary to understand the pathogenicity and antibiotic susceptibility of *H. kunzii*.

Case presentation

A 52-years-old female patient presented to the hospital after experiencing erythema, edema, and soreness within the umbilical scar tissue for five consecutive days. Approximately 10 years before, the patient had suffered an accidental burn in the umbilical

region, resulting in a wound scar with tissue hyperplasia following healing. Five days before admission, the patient sought medical attention in the emergency room of the institution for erythema, edema, and severe discomfort in the area of the scar region, without evidence of fever or other symptoms of infection. Color Doppler ultrasound revealed a fluid-filled mass below the scarred area (Figure 1). Subsequently, the patient was admitted for management of an umbilical infection. The patient reported a history of diabetes with adherence to a regular medication regimen.

Physical examination on admission revealed the presence of irregular hyperplasia of the umbilical scar tissue measuring 5 x 6 cm, accompanied by noticeable redness and swelling around the affected area. A palpable sensitive mass was observed in the center of the scar tissue. The patient was thus diagnosed with an umbilical abscess. The body temperature of the patient was recorded as 36.5 °C, respiration rate was 20 breaths per minute, pulse rate was 77 beats per minute, and blood pressure was 135/63 mmHg. Further testing revealed blood glucose level of 19 mmol/L, glycosylated hemoglobin value of 11.7%, white blood cell count of 5.7 x 10⁹/L, neutrophil percentage of 64.4%, C-reactive protein levels of 29.16 mg/L,

prothrombin time (PT) levels of 11.3 s, and activated partial thromboplastin time (APTT) levels of 24.0 s. Given the diagnosis, an incision and drainage procedure was performed on the abscess, resulting in the aspiration of approximately 20 mL of purulent material. The collected pus was aseptically transferred to a sterile container for subsequent microbiological analysis. The pus cavity was rinsed with hydrogen peroxide followed by saline, and was covered with iodophor gauze with a wrapping of sterile dressing. The patient was treated with intravenous cefazolin (1 g q8 h) to control the infection.

The pus samples were individually inoculated onto Columbia blood agar and McConkey agar, and both were incubated at 35 °C in an atmosphere containing 5% CO₂. After incubation for 24 h, tiny colonies with a distinct needle-like appearance began to emerge. Following a further incubation period of 72 h, greyish-white, translucent and slightly α -hemolytic colonies were observed on the Columbia blood agar (Figure 2), while no discernible growth was seen on the McConkey agar. The pathogen was identified as *H. kunzii* using MALDI-TOF, with a determination score of 2.13 which provided credibility to our findings.

After identification of the pathogen, the patient continued receiving routine doses of cefazolin to maintain infection control. A further culture of the wound secretions was conducted to confirm the presence of bacterial infection. This resulted in the isolation of a single pathogen with significantly reduced numbers of bacteria observed in culture, compared with the previous result. After the cefazolin treatment, the patient reported considerable relief from the pain associated with the wound and marked reductions in the amount of purulent secretion were observed, leading to her discharge and continued outpatient management

with scheduled dressing changes. Substantial healing of the wound was observed a month after discharge.

To ensure the precision of strain identification, 16S rRNA sequencing was also performed at the Guangzhou Jinyu Inspection Center. 16S rRNA sequencing indicated that the isolated strain had 98.56% identity with *H. kunzii* (GenBank accession no., NR-029237.1). The 16S rRNA sequence of the strain was deposited in the National Center for Biotechnology Information (NCBI) database with an assigned accession number of OR018343.

Discussion

Recent advances in pathogen identification technology have led to the identification of an increasingly large number of unusual pathogens capable of causing human infection. *H. kunzii*, a member of the human skin microbiota, is not usually considered pathogenic, although a limited number of studies have reported skin and soft tissue infections and bacteremia attributed to this bacterium [3,5,7,8]. In addition, occasional cases of prosthetic valve endocarditis and chronic osteomyelitis have been described [9,10], with severe cases being potentially life-threatening [11].

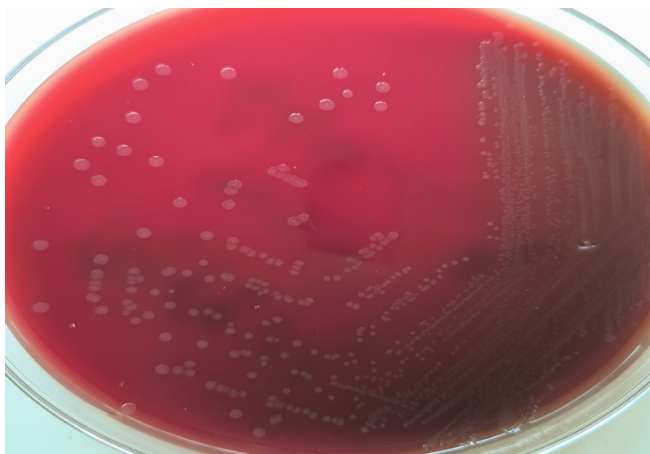
A literature search was performed in PubMed using the key words “*Helcococcus kunzii*” to identify case reports. A total of 33 relevant papers were identified and analyzed, of which 15 described the clinical diagnosis and treatment of the patient in detail. A summary of the demographic and clinical data, including risk factors and treatment, is provided in Table 1.

It has been suggested that *H. kunzii* warrants serious consideration as a potential conditional pathogen, particularly for patients with lower limb trophic

Figure 1. Ultrasonography images: fluid mass formation below scar tissue.



Figure 2. Culture colonies on blood agar plates after 72 h.



disorders, cardiovascular pathology, and diabetes mellitus [12]. In addition, the literature shows that diabetic patients are more susceptible to various types of infection, including infections by bacteria that do not usually cause infections in humans, due to weakened immune responses in these patients [13,14]. The present patient had suffered from diabetes for 10 years. Her random blood glucose assessment on admission yielded a considerably elevated reading of 19 mmol/L, suggesting that control of blood glucose levels was not effective and highlighting potential enhanced susceptibility to *H. kunzii* infection. In addition, the levels of inflammatory markers in the patient were normal except for a mild increase in C-reactive protein, consistent with a diagnosis of localized infection.

There are currently no standardized criteria for the use of antimicrobial drugs against this bacterium. Some researchers have argued that it is possible to interpret data using the 2015 European Committee on Antimicrobial Susceptibility Testing (EUCAST) breakpoints for viridans group streptococci. Literature suggests several treatment options for infections caused by *H. kunzii*. Penicillins are commonly preferred for managing *H. kunzii* infections, and the bacterium is also reported to be susceptible to all glycopeptides, linezolid, daptomycin, and tigecycline [15]. Notably, *H. kunzii* is highly resistant to erythromycin and this antibiotic is thus unlikely to be effective in clinical treatment [5,6,11,15,16]. There are also reports documenting the success of amoxicillin clavulanic acid [11], cefadroxil [6], piperacillin-tazobactam alone [5], clindamycin in conjunction with gentamicin [4], and pristinamycine combined with rifampicin [3], among other treatment options. Besides, in patients with

diabetic foot, *H. kunzii* infections were effectively treated using vacuum-sealing drainage without the use of antimicrobial drugs [7]. The present patient experienced significant improvement in the symptoms of infection following 5 days of cefazolin treatment, indicating that *H. kunzii* is susceptible to cefazolin.

Conclusions

A case of human umbilical abscess caused by the uncommon bacterial species *H. kunzii* was presented, and the efficacy of cefazolin in managing the infection was demonstrated. Further case data are necessary to elucidate the pathogenic characteristics of this pathogen.

Authors' contributions

ZC and JE: designed this study, drafted the manuscript, and provided critical revision; DW and WW: collected samples, compiled the data and drafted the manuscript. All authors reviewed the manuscript.

Availability of data and materials

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics approval and consent to participate

Ethics approval was not required and the patient gave her written consent to participate.

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Table 1. Main features of reported cases of *Helcococcus kunzii* infection.

| Year and reference | Gender / Age (years) | Underlying condition(s) | Type of infection | Treatment | Outcome |
|--------------------|----------------------|--|----------------------------|---|---------------|
| 1997 [12] | M/36 | Hypertension and hypercholesteremia | Sebaceous cyst | Flucloxacillin | Recovery |
| 1998 [6] | F/57 | None | Breast abscess | Cephalexin | Recovery |
| 2003 [3] | F/36 | None | Foot abscess | Not mentioned | Not mentioned |
| 2005 [11] | M/41 | Intravenous drug user | Bacteremia | Cloxacillin and penicillin G | Recovery |
| 2006 [2] | M/55 | Intravenous drug user | Lung septated empyema | Amoxicillin-clavulanate | Recovery |
| 2008 [16] | M/79 | Hypertension | Right heel ulcer | Not mentioned | Not mentioned |
| 2012 [4] | M/39 | Osteoarthritis | Prosthetic joint infection | Clindamycin and rifampin. | Recovery |
| 2015 [10] | M/86 | Chronic osteomyelitis | Ulcer of the lower limb | Cefuroxime and metronidazole | Recovery |
| 2014 [5] | M/58 | Diabetes | Bacteremia | Piperacillin/tazobactam | Recovery |
| 2014 [17] | M/83 | Hypertension, diabetes mellitus, and prostate cancer | Brain Abscess | Ceftriaxone, vancomycin, and metronidazole. | Recovery |
| 2014 [18] | M/80 | Diabetes, coronary disease, and hypertension | Bacteremia | None | Death |
| 2015 [19] | M/75 | Ischemic heart disease | Infectious endocarditis | Amoxicillin | Recovery |
| 2017 [9] | M/88 | Hypertension, coronary artery disease | Bacteremia | Ceftriaxone | Recovery |
| 2021 [7] | M/66 | Coronary heart disease, diabetes | Diabetic foot | None | Recovery |
| 2021 [20] | M/17 | Cholesteatoma | Empyema of posterior fossa | Ceftazidime, metronidazole, and vancomycin | Recovery |

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