



Isolation of *Staphylococcus kloosii* from an Ankle Wound of an Elderly Female Patient in Rural Saskatchewan, Canada: A Case Report

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Abstract

Staphylococcus kloosii is a rare human pathogen. We report the isolation of this organism from an ankle wound of an elderly female patient. This is only the second report of this organism from a human patient.

Keywords: *Staphylococcus kloosii*; Human infection; Female patient

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Introduction

Zoonotic infections are not new and are associated with the interactions humans have with animals, including family pets [1]. Rahman et al. suggest >60% of human pathogens are zoonotic in origin including bacteria. We have previously reported on 3 unique cases of *Staphylococcus pseudintermedius* infections from humans with clear evidence of transmission from family pets [2-4]. In all three reports, the patients had significant underlying medical conditions which may have predisposed them to infection with this organism.

Staphylococcus kloosii is a rare human pathogen and its pathogenicity is unclear. Misisic et al. [5] reported one patient that was positive with nares colonization from archived staphylococcal isolates from humans. Peer et al. [6] reported on the isolation of linezolid resistant *Staphylococcus kloosii* from a 60 year old male patient with and intracranial bleed and sepsis. Here we report isolation of *Staphylococcus kloosii* from an ankle wound in an 84 year old female patient with a prolonged skin and soft tissue lesion.

Case Presentation

Patient MT is an 84 year old female patient being cared for in a long term level 4 care home in a small rural farming community. Her past medical history includes coronary artery disease, diabetes and has dementia associated with Alzheimer's disease. The notes in her chart are sparse and specific questions related to this case were answered by her principal care givers and her daughter. In February, 2021, a swab was collected from an ankle lesion which had been persisting for a "long" time. The request to the clinical microbiology laboratory was to specifically look for Methicillin Resistant *Staphylococcus aureus* (MRSA). The wound was described as red and inflamed and the patient complained of itchiness. The patient considered the wound to be "old ringworm". The patient has been in this care home for the past 5 years and there is no history of travel. Due to province wide COVID-19 restrictions for long term care facilities, visitation was limited or not allowed and patients were restricted from leaving the facility. The patient's daughter (and family) has a farm with cattle, sheep, chickens and llamas along with dogs and cats. The rural location is also known to have an abundance of wild squirrels. The patient had not visited the family farm in the past 5 years. Goats and miniature horses were brought to the care home property for residents to interact with but it is unclear if this patient was in physical contact with them. New care products

have not been introduced to the patient in the period leading up to the ankle lesion being sampled.

Laboratory Investigations

The swab was inoculated to blood (tryptic say agar containing 5% sheep red blood cells), phenylethyl, MacConkey and Chromogenic (specific for MRSA) agar plates and incubated for 18 h to 24 h in ambient air. A Gram stain from the swab showed abundant squamous epithelial cells and abundant Gram-positive cocci in clusters. Polymorphonuclear cells were not seen. As such, this swab was likely a superficial collection from the wound rather than a “deep” ulcer collection.

Following overnight incubation, *Staphylococcus kloosii* and *Staphylococcus capitis* were recovered. The organisms were identified by Matrix Assisted Laser Desorption Ionization-Time of Flight (MALDI-TOF) (bioMerieux, Lyon France). *Staphylococcus capitis* was not further investigated and reported as “skin flora”. *Staphylococcus kloosii* was repeatedly tested by MALDI-TOF with the same identification. To further confirm the organism identification, *Staphylococcus kloosii* was sequenced using the Nanopore MinION Mk1C with sequence analysis using EPI2ME software from Nanopore Technologies. Susceptibility testing was by Kirby-Bauer and e-test as per the recommended procedures, interpretation and quality control organisms of the Clinical and Laboratory Standards Institute (CLSI).

The organism was resistant to oxacillin (Minimum Inhibitory Concentration (MIC) 1.5 µg/ml) and was D-Zone negative. It was susceptible to cefoxitin (zone size 26 mm), ciprofloxacin (26 mm), clindamycin (24 mm), erythromycin (28 mm), linezolid (MIC 2 µg/ml), moxifloxacin (28 mm), rimethoprim/sulfamethoxazole (TMP/SMX) (34 mm) and vancomycin (MIC 0.75 µg/ml). The patient was treated with cephalixin 500 mg 4 times/day for 10 days and the wound returned to “normal”. Further testing or antimicrobial therapy was not done.

Discussion

We report on recovery of *Staphylococcus kloosii* from an ankle wound of an elderly lady in a long-term level 4 health care facility without an explanation on how this organism might have been transmitted to this patient. To the best of our knowledge, this is only the 2nd report of this organism being recovered from a human specimen with a suspected infection. Peer et al reported a 60 year old male patient with an intracranial bleed and sepsis associated with *Staphylococcus kloosii* and the patient subsequently died. In their report, the organism was susceptible to ciprofloxacin, gentamicin, amikacin, vancomycin, teicoplanin and tigecycline but resistant to penicillin, oxacillin, erythromycin, clindamycin, TMP/SMX, ofloxacin and linezolid. Our isolate was borderline oxacillin resistant (MIC 1.5 µg/ml) but cefoxitin susceptible and pan susceptible to the non-beta lactam agents tested. Borderline oxacillin resistance has been previously described with *Staphylococcus aureus* [7] and *Staphylococcus pseudintermedius* [4]. Unfortunately, there was no suggestion in the case report from Peer et al. as to neither where this organism might have been acquired nor a sufficient description of the patient and patient’s environment to make any assumptions.

Staphylococcus kloosii a coagulase negative Gram positive cocci within the *Staphylococcus* genus of bacteria and are typically novobiocin, erythromycin and bacitracin resistant [8]. Schleifer et al. [9] indicated that *Staphylococcus kloosii* is mainly found on the

skin of various wild animals, including squirrels and only rarely on farm animals [9]. Prevalence data on this organism in wildlife in Saskatchewan and Canada is unavailable. This organism has also been associated with soy sauce manufacturing during the fermentation process [10], from sweet paste (Chinese Traditional Seasoning) [11], from the respiratory tree of *Holothuria* (*Mertensiothuria*) *leucospilota*-sea cucumber in Malaysian waters [12] and in the nasal passage of the common buzzard (*Buteo buteo*) [13]. Sea cucumbers are in high abundance in marine Malaysian environments being used in both traditional and modern medicine. As well, they are also an important food source for some geographical regions of Malaysia. There is no indication that our patient had any connection to medicines or products that could have been potentially contaminated with this organism. Becker et al. reported on *Staphylococcus kloosii* from goats [14] and Condas et al. [15] reported 1 strain recovered from dairy cows from 91 farms in Canada in 2007-2008 as part of a national study investigating bovine mastitis. The rarity of this organism from cattle makes acquisition from these farm animals unlikely. Fountain et al. [16] reported on *Staphylococcus kloosii* from fruit bats (*Pteropus livingstonii*) and Montgomery et al. [17] reported on recovery of this organism from the oral cavity of 1/23 wild Komodo dragons (*Varanus komodoensis*). These are not associated with our patient.

Conclusion

In summary, we report a case of *Staphylococcus kloosii* from an ankle wound of an elderly female patient with no obvious source of transmission from an animal or animal environment. The apparent rarity of this organism raises an intriguing question as to its source. Regardless, this represents only the 2nd report of this organism from a human patient and potentially related to infection.

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