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Streptococcus canis Bacteremia in a Patient Co-Infected with COVID-19: A Case Report

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Abstract: *Streptococcus canis*, primarily recognized as a commensal pathogen in animals, has emerged as a potential cause of human infections, including bacteremia. We present a case of *S. canis* bacteremia in an 83-year-old male with a history of coronary artery disease, hypertension, and type 2 diabetes mellitus. The patient presented with fever, chills, malaise, and slurred speech, with subsequent blood cultures yielding growth of *S. canis*. This case underscores the significance of *S. canis* as an emerging pathogen in humans, particularly in individuals with underlying health conditions such as diabetes, coronary artery disease, advanced age, or compromised immune function. The challenges in diagnosis, treatment, and management are discussed, emphasizing the importance of heightened clinical awareness, timely intervention, and multidisciplinary collaboration in addressing infections caused by this pathogen. Further research is warranted to optimize management strategies for *S. canis* bacteremia in humans, aiming to improve patient outcomes and guide public health interventions.

Keywords: bacteremia; *Streptococcus canis*; zoonotic

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Introduction

Streptococcus canis, primarily recognized as a pathogen in animals such as dogs and cats, has been increasingly identified as a cause of serious infections in humans, including bacteremia. Bacteremia, the presence of bacteria in the bloodstream, is a critical condition in clinical medicine due to its potential to lead to severe systemic infections. Although *S. canis* is encountered less frequently than

other streptococcal species, it has been reported as a causative agent of bacteremia in humans, particularly those with underlying health conditions or compromised immune systems. Among streptococcal infections, only 1% can be attributed to *S. canis*, a reflection of its rarity as a causative microorganism [1].

The significance of *S. canis* bacteremia extends beyond its capacity to induce acute illness. It often presents with nonspecific symptoms, complicating diagnosis and potentially delaying appropriate treatment [1]. Additionally, antibiotic resistance among streptococcal species, including *S. canis*, poses further challenges to effective management strategies.

Given the evolving landscape of infectious diseases and the potential for *S. canis* to cause significant morbidity and mortality in vulnerable populations, increased awareness, surveillance, and research are crucial. A deeper understanding of the epidemiology, pathogenesis, and optimal management of *S. canis* bacteremia in humans will enhance patient outcomes and inform public health interventions aimed at preventing and controlling infections caused by this emerging pathogen.

Case Presentation

An 83-year-old male with a past medical history of coronary artery disease (status post right coronary artery stent placement), hypertension, and type 2 diabetes mellitus presented with generalized weakness, malaise, and subjective slurred speech. On the day of symptom onset, the patient had been golfing in the heat when he experienced significant malaise and weakness, prompting him to take a nap. Upon waking, he noticed speech impairment and called EMS.

In the emergency room, the patient no longer exhibited speech deficits but had a fever of 102.9 $^{\circ}$F. Other vital signs included a respiratory rate of 25 breaths per minute, heart rate of 100 beats per minute, blood pressure of 146/67 mmHg, and oxygen saturation of 93% on room air. Laboratory tests were generally unremarkable. Complete blood count revealed white blood cells at 10.4 $\times$ 10^3/uL, hemoglobin at 12.5 g/dL, and platelets at 99 $\times$ 10^3/uL. The comprehensive metabolic panel showed an elevated creatinine level of 1.37 mg/dL (baseline: 0.9 mg/dL), consistent with acute kidney injury. Lactic acid was within normal limits at 1.4 mmol/L. C-reactive protein was elevated at 56.4 mg/L. The patient was administered 1 liter of intravenous normal saline and 1 g of ceftriaxone due to concerns of an infectious etiology.

Given the concern for cerebrovascular pathology, a neurology consultation was requested. However, a full workup including computed tomography (CT) of the head, CT angiogram of the head and neck, and magnetic resonance imaging of the brain were all negative for cerebrovascular accident.

Concurrently, an infectious workup was initiated due to symptoms and vital signs suggesting systemic inflammatory response syndrome (SIRS). Urinalysis was negative, correlating with the absence of urinary symptoms. Chest X-ray showed no signs of consolidation or cardiopulmonary pathology. Influenza A/B antigen test was negative. However, the result was positive for COVID-19 polymerase chain reaction test. Supportive care was initiated, including pain management and as-needed acetaminophen for fevers. Remdesivir was not indicated given the patients clinical presentation and adequate oxygenation on room air.

The patient continued to experience chills and rigor, at which time initial blood cultures from admission returned positive for *S. canis* in two separate cultures. Infectious disease was consulted, and the patient started on 2 grams of ceftriaxone daily, along with a loading dose of vancomycin. A transthoracic echocardiogram was negative for any valvular pathology, including vegetations. The patient was questioned about interactions with animals, particularly any scratches or bites. He reported living with two small dogs that often licked him but denied any scratches or bites. A full skin examination was benign.

After the initiation of antibiotics, follow-up blood cultures were negative. The patient experienced rapid clinical improvement and was discharged with a prescription for cefuroxime 500 mg twice daily for 1 week, with instructions to follow up with the outpatient Infectious Disease service.

Discussion

Streptococcus canis, widely understood among the veterinary community as a commensal bacterium across various animal species, commonly causes respiratory, cutaneous, and genitourinary infections, as well as bacteremia [1]. Though originally thought to be primarily pathogenic in canine and bovine species, *S. canis* has since been found among a diverse range of mammals, including humans, albeit rarely [2]. The first well-documented case demonstrating the invasive capacity of *S. canis* within a human host was documented in 1996 in a 77-year-old male who developed septicemia from *S. canis*, confirmed via DNA analysis, transmitted from his family dog to his varicose ulcers [3]. Here we present a significant case of *S. canis* bacteremia in a human host, highlighting several pertinent clinical and microbiological considerations.

Among streptococcal infections, only 1% can be attributed to *S. canis*, a reflection of its rarity as a causative microorganism [1]. Clinically, in humans it presents most often as skin and soft-tissue infections, often polymicrobial with associated *Staphylococcus aureus*, enterobacteria, coagulase-negative staphylococci, *Pseudomonas aeruginosa*, and group A beta-hemolytic streptococci [1]. In our case, the patient presented with a single bacterial infection of monomicrobial bacteremia. With no other identified primary source of obvious bacterial infection, our case presents uniquely as a solely hemoculture positive presentation of *S. canis*.

The zoonotic potential of *S. canis* is well-documented, supported by several cases of transmission to humans from close contact with household pets [4]. In our patient, a history of frequent exposure to dogs, and in particular, recurrent contact with oral flora, provided a plausible mode of transmission, emphasizing the importance of meticulous epidemiological investigation in cases of atypical bacteremia. It is widely known that *S. canis* can colonize the skin and mucosa of otherwise asymptomatic dogs and cats [2]. Our case prompts an inquiry into whether this widely known zoonotic pathogen has developed virulence that enables colonization of human hosts and initiation of invasive infections. This is particularly important in patients with associated comorbidities or who are otherwise immunocompromised. Patients infected with *S. canis* are likely to have associated pathologies including cardiovascular, neoplastic, and diabetic disease [1]. Our patients medical history, including coronary artery disease, hypertension, and type 2 diabetes mellitus, likely predisposed him to susceptibility. Concurrently, his active COVID-19 infection further exacerbated his immunocompromised state.

Several challenges exist in managing *S. canis* bacteremia. First, its rarity means that clinicians may not initially consider it in differential diagnoses, leading to potential delays in appropriate treatment. Additionally, antibiotic resistance patterns of *S. canis* are not well-documented, which can complicate the selection of empirical therapy [5]. This case illustrates the need for heightened clinical awareness and consideration of zoonotic pathogens in patients with relevant exposure histories.

Conclusion

This case underscores the significance of *Streptococcus canis* bacteremia as an emerging pathogen in humans, particularly in those with underlying health conditions or concurrent infections. Early recognition and initiation of appropriate therapy, facilitated by thorough history-taking, including exposure to animals, and the identification of *S. canis* in blood cultures, can lead to rapid clinical improvement and favorable outcomes. In conclusion, *S. canis* bacteremia in humans is a rare but noteworthy entity that requires heightened clinical suspicion, accurate microbiological identification, and prompt antimicrobial therapy for favorable outcomes.

Our institution does not require ethical approval for reporting individual cases or case series.

Written informed consent was obtained from the patient for their anonymized information to be published in this article.

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