



Review

Staphylococcus intermedius is not only a zoonotic pathogen, but may also cause skin abscesses in humans after exposure to saliva

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SUMMARY

Background: *Staphylococcus intermedius* is a very rare human pathogen. There are only 16 cases in the literature that have described *S. intermedius* as a cause of infection in humans. Most of these cases have been described in association with exposure to animals, mostly dogs. However, this pathogen can cause infection in healthy individuals even without exposure to animals.

Methods: All previous cases of *S. intermedius* infection included in our literature review were found using a PubMed search (1960–November 2009) of the English-language medical literature applying the terms '*Staphylococcus intermedius*', 'abscess', 'infection', 'humans'. The references cited in these articles were examined to identify additional reports.

Results: We describe the first case of skin abscesses caused by *S. intermedius* in an immunocompetent patient who used intravenous cocaine after coating his syringes with his saliva. We also summarize the literature regarding infections caused by *S. intermedius* in humans.

Conclusions: This case illustrates for the first time that *S. intermedius* can cause skin abscesses in humans after direct inoculation of this pathogen into the skin and soft tissues. Clinicians should be aware of the fact that although the vast majority of infections from coagulase-positive *Staphylococcus* infections are secondary to *Staphylococcus aureus*, *S. intermedius* is also a potential pathogen in humans.

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1. Introduction

Staphylococcus intermedius is a coagulase-positive *Staphylococcus* that is a very rare cause of infection in humans, despite being pathogenic in animals.¹ We describe, for the first time, a case of skin abscesses that were caused by *S. intermedius* in an intravenous drug user and we summarize the available literature on infections caused by *S. intermedius* in humans.

2. Case report

A 43-year-old male with a history of chronic hepatitis C infection and opioid dependence presented with chills after developing two skin abscesses in the right forearm two days after injecting intravenous cocaine. The patient denied any exposure to animals. He had the habit of licking the syringes prior to injecting cocaine 'to prevent clotting'. He was afebrile with a temperature of 36.5 °C, hemodynamically stable, and he had two abscesses in the forearm, one 2 × 3 cm and the other 2 × 2 cm (Figure 1).

Pertinent laboratory investigations revealed a white blood cell count of $5.1 \times 10^9/l$ with 70% polymorphonuclear cells. The patient underwent incision and drainage of the two abscesses. Gram staining of the pus revealed Gram-positive cocci in clusters, and vancomycin 1 g intravenously every 12 h was administered empirically. Coagulase-positive staphylococci grew in the culture of the pus and further testing identified the organism as *S. intermedius*. More specifically, white glistening microbial colonies were isolated on blood and MacConkey agar. The colonies were coagulase-, pyrrolidonyl arylamidase-, and *o*-nitrophenyl-β-D-galactopyranoside-positive. The isolate was identified correctly as *S. intermedius* after analysis with the ID32 Staph system using the API database. 16S rRNA gene sequence analysis confirmed the presence of this rare human pathogen. Sensitivity testing revealed that the isolate was susceptible to oxacillin, ampicillin/sulbactam, cefazolin, levofloxacin, clindamycin, doxycycline, gentamicin, trimethoprim-sulfamethoxazole, and vancomycin. The patient was further treated with 875 mg of oral amoxicillin-clavulanic acid twice daily for a total of two weeks with resolution of the abscesses. Unfortunately, cultures of saliva and nasal/oropharyngeal cultures were not performed in our case, since the patient was discharged prior to final identification of the pathogen.

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Figure 1. Two abscesses in the forearm (one 2 × 3 cm and the other 2 × 2 cm) that developed two days after intravenous cocaine use.

3. Discussion

Staphylococcus intermedius is a coagulase-positive *Staphylococcus* and a zoonotic organism that can be isolated from dogs, pigeons, minks, cats, horses, foxes, raccoons, goats, and gray squirrels.¹ Talan et al. calculated the prevalence of this microorganism in dogs as 39%.² Although this bacterium is pathogenic in animals, it has been identified very rarely as a cause of infection in humans. Human carriage of *S. intermedius* is uncommon (less than 20%), based on culture of saliva and *S. intermedius* anti-DNAse antibodies.^{3–7} Previous isolations of *S. intermedius* from humans have been described in either case reports^{1,8,9} or in the context of studies on populations with an increased risk of acquiring *S. intermedius* infections (veterinarians and patients bitten by dogs).^{2,5,8,10} In the latter population, a higher prevalence of this species may be assumed, since risk factors for acquiring or harboring *S. intermedius* are occupational exposure to pets (e.g., veterinarians) and bites from certain animals, including dogs.^{2,5,8,10} However *S. intermedius* can also be a pathogen in humans, as our case indicates. Thus, we summarize the available scientific evidence regarding the role of *S. intermedius* as a pathogen in humans.

All previous cases included in our literature review were found using a PubMed search (1960–November 2009) of the English-language medical literature applying the terms '*Staphylococcus intermedius*', 'abscess', 'infection', 'humans'. The references cited in these articles were examined to identify additional reports.

S. intermedius has been described as a human pathogen in 16 cases in the literature.^{1,8,9,11–18} One case of infectious endocarditis caused by *S. intermedius* in a patient with HIV infection was reported in the Spanish literature and was not included in our analysis.⁹ Thus, we summarize the data from 15 cases of *S. intermedius* infections in humans (Table 1).^{1,8,11–18} The most frequent clinical presentations are wound infections.^{8,11,12,15} In 1989, Talan et al. described *S. intermedius* as a human pathogen for the first time in three cases of dog-bite-induced soft tissue infection, which were treated with penicillin and amoxicillin-clavulanate. In humans, it is recognized as an invasive zoonotic pathogen and has been isolated from 18% of canine-inflicted wounds.⁸ Cellulitis and a malodorous discharge are common, while regional adenopathy, fever, and lymphangitis occur in only 20% of cases.¹⁰ The true incidence of *S. intermedius* in human wound infections is probably underestimated, because coagulase-positive staphylococci are often misclassified as *Staphylococcus aureus*.¹

Table 1
Staphylococcus intermedius infections in humans (described in the English-language literature^a)

Author, year [Ref.]	Age, years	Sex	Underlying conditions	Type of infection	Treatment	Outcome
Kempker, 2009 [18]	28	F	Had trans-sphenoidal endoscopic tumor removal 5 weeks prior complicated by a CSF leak. Canine exposure	Sinusitis	Bilateral sphenoideotomy with the removal of infected fat grafts, vancomycin and then linezolid for a total of 6 weeks	Complete recovery
Atalay, 2005 [16]	4	M	None	Brain abscess	Stereotactic drainage of abscess, vancomycin 40 mg/kg/day for 8 weeks	Partial recovery
Kikuchi, 2004 [17]	51	F	Had radical mastoidectomy for chronic otitis media with cholesteatoma. Canine exposure	Mastoiditis	Local cleaning with saline washes, ofloxacin ear drops	Complete recovery
Pottumarthy, 2004 [15]	60	F	Breast cancer under chemotherapy	Nail bed infection	NR	NR
Pottumarthy, 2004 [15]	37	M	None	Leg wound infection	NR	NR
Tanner, 2000 [14]	38	F	Canine exposure	Otitis	Topical antibiotics neomycin and polymyxin B	Complete recovery (approximately 4 days)
Gerstadt, 1999 [13]	73	M	Diabetes mellitus type II	Hospital-acquired pneumonia	Vancomycin	Complete recovery
Vandenesch, 1995 [1]	63	M	Metastatic non-small cell lung carcinoma, splenectomy. Pet exposure (cat)	Catheter-related bacteremia	Amoxicillin-clavulanate and ciprofloxacin for 10 days	Complete recovery
Lee, 1994 [8]	NR	NR	Pet exposure (dogs)	Wound infections	NR	NR
Barnham, 1992 [12]	78	M	Pet exposure (dog)	Wound infection	Hydrogen peroxide lavage and a course of amoxicillin-clavulanate	Complete recovery
Talan, 1989 [11]	45	M	Pet exposure	Wound infection	Amoxicillin-clavulanate (for 10 days)	Complete recovery
Talan, 1989 [11]	20	M	Pet exposure	Cellulitis	Penicillin (5 days)	Complete recovery
Talan, 1989 [11]	34	F	Pet exposure	Wound infection	Penicillin (5 days)	Complete recovery

M, male; F, female; NR, Not reported; CSF, cerebrospinal fluid.

^a A case of endocarditis caused by *Staphylococcus intermedius* (Llorca et al. 1992) described in the Spanish literature is not included in the table.

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