

# Metastatic Complications from *Staphylococcus intermedius*, a Zoonotic Pathogen

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**Metastatic infection is an infrequent complication of non-*Staphylococcus aureus* staphylococcal infection. Here we report a case of bloodstream infection due to *Staphylococcus intermedius*. To our knowledge, ours is the only known case of metastatic infection with *S. intermedius*.**

## CASE REPORT

A 76-year-old man with type II diabetes mellitus and myelodysplastic syndrome was admitted to our hospital with a generalized rash. Four months prior, he was diagnosed with new-onset psoriasis and received acitretin for 3 weeks. The morphology of the rash had various features, including a morbilliform eruption intermixed with papules coalescing into plaques on the back and chest, plaques with scaling and fissuring on the arms and upper thighs, and thick hyperkeratotic scaling of both soles.

His past medical history was also significant for diabetic retinopathy and osteomyelitis requiring amputation of the right 4th and 5th toes 5 years previously. He lived at home with his wife and dog. He denied any recent dog bites.

He was admitted with the diagnosis of drug hypersensitivity. He was afebrile on admission, with a slight leukopenia (3,700 cells/ $\mu$ l). He initially improved on treatment with intravenous corticosteroids but subsequently developed arthralgias of multiple joints, generalized weakness, and confusion.

On hospital day 14, he first developed fever (38.6°C). Examination showed a grade III/VI systolic murmur at the left sternal border (consistent with a baseline exam), a 3-mm nonpurulent, dry ulcer on the plantar surface of the left first metatarsophalangeal joint, and hyperkeratotic lesions and deep fissuring of the foot. All extremities and joints were tender. Blood cultures (BacTAlert blood culture system; bioMérieux) yielded Gram-positive cocci in 4 of 4 bottles; a staph latex test (Staphaurex; Remel) was negative, leading to the identification of the organism as staphylococcus but not *Staphylococcus aureus* (SNA). Isolate testing in manual antibiotic dilution revealed a vancomycin MIC of <2  $\mu$ g/ml, and intravenous vancomycin was administered. Blood cultures remained positive for SNA from hospital days 14 through 22. He developed septic arthritis of both shoulders and both elbows and an abscess of the right iliacus muscle. He underwent multiple aspirates and incision and drainage procedures; all cultures yielded a heavy growth of SNA. He received intravenous vancomycin for 52 days and was discharged to a rehabilitation facility after a 9-week hospitalization.

All the blood and fluid cultures were initially reported by the hospital laboratory as SNA. Subsequent manual biochemical testing took place in our reference laboratory. The colony morphology was described as large, white, and beta-hemolytic; colonies appeared as large Gram-positive cocci in clusters and tetrads on Gram stain, growing on both aerobic and anaerobic media, with better aerobic growth. The biochemical tests performed were posi-

tive for catalase, tube coagulase, arginine utilization at 48 h, urease, nitrate, trehalose, mannitol, mannose, sucrose, and maltose, with weak positivity for pyruvate (Pyr). Colonies were novobiocin susceptible, had a negative reaction to oxidase, ornithine, esculin, xylose, cellobiose, lactose, arabinose, and raffinose, and did not produce acetoin (Voges-Proskauer test). These biochemical tests led to the species identification of the isolate as *Staphylococcus intermedius*.

*Staphylococcus intermedius* is a coagulase-positive staphylococcus first described in 1976 (6). It is a commensal, living in the oral cavity and on the body surfaces of various animals, including dogs, pigeons, minks, cats, foxes, raccoons, gray squirrels, goats, and horses (3). Moreover, it is a recognized pathogen in animals, causing infections of skin, bone, respiratory tract, genitourinary tract, and central nervous system (14).

*S. intermedius* was first identified as a human pathogen in 1989, when a series of cases of dog bite-induced cellulitis revealed *S. intermedius* as the causative organism in 3 of 14 cases (15). In a 1-year study of 144 veterinary staff members who were exposed to dogs, only 1 person had *S. intermedius* cultured from the nasopharynx, whereas 30 persons (21%) carried *S. aureus* (15). Our patient may have acquired this organism through animal contact prior to admission.

Excluding outbreaks of gastroenteritis in which *S. intermedius* was implicated (9), only 17 human cases of *S. intermedius* infection have been reported (Table 1). Of these, only 4 cases had non-cutaneous infection, including single cases each of endocarditis and brain abscess. To our knowledge, ours is the first report of metastatic infection involving *S. intermedius*. The clinical manifestations in our patient were similar to the well-recognized complications of *S. aureus* bacteremia.

Approximately one-half of *S. intermedius* isolates possess protein A and clumping factor (bound coagulase) (4). As a result, latex agglutination tests, which rely on detection of clumping fac-

Received 20 July 2011 Returned for modification 6 September 2011

Accepted 6 December 2011

Published ahead of print 14 December 2011

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doi:10.1128/JCM.05170-11

TABLE 1 Case reports of *Staphylococcus intermedius* infection in humans

Case no.	Yr reported	Description (reference)	Site or type of infection	Immune deficiency/ underlying illness	Drug susceptibility <sup>c</sup>	Antibiotic treatment	Outcome
1–3	1989	Case series of canine-inflicted cellulitis (13)	Skin/soft tissue	None	Two isolates S to PCN, one isolate R to PCN	PCN, amox-clav	Recovered
4	1992	Case report (11)	Endocarditis	HIV	NR	Cloxacillin, gentamicin followed by oral ciprofloxacin and rifampin	NR
5	1992	Case report (2)	Skin/soft tissue	None	R to PCN, tetracycline S to amox-clav, erythromycin, flucloxacillin, gentamicin, sodium fusidate	Amox-clav	Recovered
6–8	1994	Case series of canine-inflicted and non-canine-inflicted wounds (17)	Skin/soft tissue	NR <sup>a</sup>	NR	NR	NR
9	1995	Case report (17)	Catheter-related bacteremia	Metastatic lung cancer, splenectomy	S to PCN, oxacillin, gentamicin, erythromycin, rifampin, cotrimoxazole, vancomycin	Amox-clav, ciprofloxacin	Recovered
10	1999	Case report (5)	Pneumonia	Diabetes	R to PCN, oxacillin, clindamycin, erythromycin, ofloxacin; S to TMP-SMX, gentamicin, vancomycin	Vancomycin	Recovered
11	2000	Molecular phylogenetic analysis (16)	Otitis externa	None	NR	NR	NR
12	2004	Case report (10)	Mastoiditis	None, but s/p <sup>b</sup> mastoidectomy	Pansensitive, including PCN	Ofloxacin	Recovered
13, 14	2004	Case series (12)	Skin/soft tissue	Case 13, breast cancer on chemotherapy; case 14, none	Case 13 isolate was pansensitive except to PCN and produced $\beta$ -lactamase; case 14 isolate was sensitive to all but PCN and tetracycline	NR	NR
15	2005	Case report (1)	Brain abscess	None	R to PCN, methicillin, clindamycin	Vancomycin	Recovered
16	2009	Case report (8)	Sinusitis	None	R to ceftazolin, oxacillin, levofloxacin, cotrimoxazole, tetracycline; I to gentamicin; S to vancomycin, linezolid, rifampin	Vancomycin, linezolid	Recovered
17	2011	Case report (7)	Skin abscesses	Hepatitis C	S to oxacillin, ampicillin-sulbactam, ceftazolin, TMP-SMX, vancomycin	Vancomycin, amox/clav	Recovered

<sup>a</sup> NR, not reported.

<sup>b</sup> s/p, status post.

<sup>c</sup> PCN, penicillin; amox-clav, amoxicillin-clavulanate; TMP-SMX, trimethoprim-sulfamethoxazole; R, resistant; I, intermediate; S, susceptible.

tor or protein A, may be negative and can lead to an initial identification as SNA, as in the initial identification of our isolate, although subsequent manual testing did indicate the isolate was coagulase positive.

In summary, we report an unusual case of *S. intermedius* bacteremia with multiple metastatic complications requiring surgical intervention and an extended course of vancomycin. This case illustrates the potential for SNA strains to cause invasive infection.

## ACKNOWLEDGMENT

There are no potential conflicts of interest.

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