









CASE REPORT

Severe Community - Acquired *Achromobacter denitrificans* Cellulitis

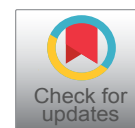
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Abstract

Achromobacter is a genus of non-fermenting gram-negative bacteria, mainly isolated from the respiratory tract of people with cystic fibrosis, but recognized as the causal agent of different types of infections, especially in individuals and with chronic diseases and immune deficiency. Skin infections are very rare and not easy to manage also due to the intrinsic resistance to various antibiotics empirically used in the treatment of skin infections. In this short report, we intend to describe a rare case of *Achromobacter denitrificans* cellulitis with the result of an analysis of the cases described in the literature.

Keywords

Achromobacter denitrificans, Acute bacterial skin-skin infection (ABSSI), Community-acquired, Immunocompromised host, Literature review

Introduction

A rare episode of acute, severe community-acquired bacterial skin-skin tissue infection by *Achromobacter denitrificans* is described, on the ground of the existing literature in this field. *A. denitrificans* has been widely isolated in natural environment, especially in soil and water, may be part of the normal flora of the ear and the gastrointestinal and respiratory tracts in some people, and, have been recognized as emerging pathogens causing a wide range of human infections in recent years [1-3]. However, infections of the skin

and soft tissue are rarely reported [4]. We report a rare case of severe cellulitis due to this organism, the first case documented in Italy, in a 55-year-old female with colonic cancer and diabetes after a traumatic injury.

A. denitrificans is an emerging gram-negative non-fermenting rod has been primarily isolated from respiratory tract of people with cystic fibrosis, and recorded in sporadic reports as an opportunistic bacterial pathogen, especially in nosocomial settings, with catheter-related bacteremia and pneumonia as the most frequent clinical presentations. Since late 1990s its taxonomy changed [1-3], and it was distinguished from other environmental gram-negative bacilli like *Alcaligenes xylosoxidans* and *Xanthomonas maltophilia*, responsible for multiple site infections of the compromised host, and also showing an unpredictable profile of *in vitro* antibiotic susceptibility [1-3]. We herewith discuss a unique case of community-acquired *A. denitrificans* acute skin-skin structure infection (ABSSI). Few cases are reported in literature involving skin and soft-tissue, and, to our knowledge, none of them were reported in Italy.

Case Report

A 55-year-old male already suffering from a metastatic colonic cancer and type 2 diabetes mellitus, developed a severe ABSSI involving also tendons after a

Table 1: Previous reports of cellulitis with *Achromobacter xylosoxidans* denitrificans, detail in type of infection, antimicrobial resistance, and treatment.

Year reported	Age/ Sex	Type of infection	Isolation specimen	Comorbid conditions	Predisposing factors	Resistance Profile	Antibiotic of choice	Treatment duration	Outcome
1988, Spear JB, et al. [9]	79/F	Bacteremia, cellulitis (flank)	Blood, deep wound exudate, well water	Metastatic breast carcinoma, treatment with hydrocortisone	Ingestion of well water The patient's home drinking water was identified as the source of infection	GE, AMK, CFPM	TMP-SMX, IMI/CS+PN	Few days	Died
1991, San Miguel VV, et al. [11]	41/M	Bacteremia, septic arthritis, and recurrent cellulitis (ankle, knee, wrist)	Blood, synovial fluid	Systemic lupus erythematosus	Ingestion of well water	Not reported	PIP, 3.ceftazidime	1. 14 days 2. 1 month 3. Not reported	Cured
2014, Tena D, et al. [4]	73/M	Wound infection, cellulitis (foot)	Wound exudate	Parkinson disease, obesity, alcoholism, deep vein thrombosis	Chronic vascular insufficiency, trauma	PIP/TAZ, TMS/SMX, IMI/CS	AMCL		Cured
2015, Dai J, et al. [5]	20/M	Cellulitis of the left neck, bulky lymphadenitis and bacteremia	Culture of a neck aspirate, blood	ALL	Reinduction chemotherapy	AMK, GM, CFPM, CIFX	AMK and IMI/CS	3 days	Died
2015, Pamuk G, et al. [6]	15/F	Ankle osteomyelitis complicating superficial thrombophlebitis	Blood	No	Ankle local trauma	Not reported	MEPM and AMK	4 weeks	Cured
2021, Oyama Y, et al. [7]	49/M	Cellulitis on left leg.	Blood, exudate culture	Relapsed AML	H SCT	AMK, AZT, GM, CFPM	MEPM, PIPC/TAZ	2 weeks	Cured
2016, Kikuchi T, et al. [8]	80/M	Cellulitis and bacteremia	Blood	MM	Bortezomib therapy	CFPM, AMK, CPFX	MEPM	2 weeks	Cured

traumatic injury at his left foot, which caused a massive tissue damage.

The material obtained after surgical debridement allowed the growth of *Achromobacter denitrificans*, which proved resistant to cefotaxime-ciprofloxacin, while all other antibiotic compounds tested sensitive (Susceptibility: amikacin Mic 4, cefepime Mic 2, ceftazidime Mic < 1, gentamycin Mic 2, imipenem Mic 2, meropenem Mic 0.25, piperacillin/tazobactam Mic <= 4).

Laboratory examinations showed a mild leukocytosis-neutrophilia, and serum C-reactive protein level of 15.4 mg/L. Based on the *in vitro* susceptibility study, i.v. gentamycin was introduced at 240 mg/day, instead of co-amoxycylav and ciprofloxacin. Hyperbaric oxygen therapy and daily medications followed orthopedic surgery. Vacuum-assisted closure (VAC) therapy was also employed, as a bridge to a plastic surgery intervention.

Discussion

A. xylosoxidans, subspecies *denitrificans*, is a gram-negative rod recently implicated as an emerging cause of infection in both immunosuppressed and immunocompetent populations. Skin and soft tissue infections (SSTIs) caused by *A. xylosoxidans* have been very infrequently reported. Clinical presentation previously described included more commonly surgical wound infection and superficial wound infection, infection of vascular infection and more rarely skin abscesses [4].

To date, only a few cases of cellulitis caused by *A. denitrificans* have been reported in the literature [5-10] as summarized in Table 1. The case which we describe is the first community acquired cellulitis due to this organism in an immunocompromised patient documented in Italy.

Apart from the only case series of Tena D, et al. [4], who reported even 14 patients with an *A. denitrificans* ABSSI with infected vascular ulcer as the most common presentation [9,10], the other authors recorded only single cases [5-8].

Dai J, et al. described a pediatric case of cellulitis-bacteremia [5]; Pamuk G, et al. recorded an osteomyelitis with purulent discharge from the ankle complicating superficial thrombophlebitis, due to local trauma caused by tight fitting shoes [6]. Oyama Y, et al. discussed the first case of cellulitis after hematopoietic stem cell transplantation [7], while Kikuci T, et al. referred on a case of cellulitis during biologic therapy for multiple myeloma [8]. Treatment of *A. denitrificans* may be difficult due to drug resistance to most cephalosporins, aztreonam, aminoglycosides and narrow spectrum penicillins. Immunocompromised hosts, patients with devices, chronic underlying conditions (e.g., diabetes mellitus, chronic renal failure, chronic heart diseases), and current or previous hospitalization or health care exposure are at risk. In conclusion, also in the absence of a nosocomial setting, clinicians should be aware

of this emerging gram-negative pathogen: although intrinsically poorly virulent, it may be responsible of local, complicated disease manifestations.

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Conflicts of Interest

None.

Patient's Consent

A signed informed consent for publication was obtained, and the manuscript is in accordance with the institution's ethics committee.

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