Necrotizing Fasciitis and Septic Shock Related to the Uncommon Gram-Negative Pathogen *Sphingobacterium multivorum*

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We report the first case of necrotizing fasciitis due to the uncommon Gram-negative pathogen *Sphingobacterium multivorum* in an immunocompromised patient, who presented with septic shock. This case adds necrotizing fasciitis to the spectrum of *S. multivorum*-related infections and highlights the emergence of Gram-negative bacteria in severe soft tissue infections.

**CASE REPORT**

A 64-year-old woman was referred to our intensive care unit (ICU) for septic shock. Her medical history included rheumatoid arthritis that had been treated with long-term intermediate-dose corticosteroids (0.25 mg/kg of prednisone per day for more than 30 years), morbid obesity (body-mass index, 33.5 kg/m²), type 2 diabetes mellitus, and coronary disease. Her current treatment included 15 mg prednisone per day, rosuvastatin, metformine, atenolol, perindopril, aspirin, and furosemide. Twenty-four hours after her dog scratched her right leg, she developed fever and leg pain. She presented at the emergency department 48 h after the injury; her central body temperature was 38.2°C, heart rate was 100 beats/min, blood pressure was 82/43 mmHg, and respiratory rate was 35/min. She was confused. Her skin was mottled from legs to abdominal wall. Her right leg was erythematous and tender to palpation with swelling. The rest of the examination was uninformative. Biological results were as follows: C-reactive protein, 583 mg/liter (normal value [N], <6 mg/liter); leukocyte count, 12.2 × 10⁹/liter; arterial lactate level, 7.9 mmol/liter (N, <2 mmol/liter); HCO₃⁻ level, 13.4 mmol/liter; creatininemia, 320 μmol/liter; and creatinine phosphokinase level, 874 IU/liter (N, <200 IU/liter). She was transferred to our ICU, where broad-spectrum antibiotic therapy, consisting of amoxicillin-clavulanate, clindamycin, and gentamicin, was initiated along with fluid loading. The blood pressure remained low, and the patient became comatose. She required circulatory support with norepinephrine up to 2.9 µg/kg/min, mechanical ventilation, and low-dose steroids. Her condition deteriorated in the first 48 h to multiple organ failure with acute anuric renal failure requiring renal replacement therapy and disseminated intravascular coagulation (platelet count was 41 × 10⁹/liter and prothrombin rate was 51%, whereas initial values were normal). At the same time, the patient exhibited soft tissue necrosis of the right leg, prompting extensive surgical debridement. Surgical findings revealed a typical aspect of necrotizing fasciitis (NF), with gray necrotic tissues and lack of bleeding, that was subsequently confirmed by histological examination.

Three blood cultures from samples taken before antibiotic treatment and surgery remained sterile. Gram-stained surgical samples (fascia and subcutaneous tissues) displayed polymorphic Gram-negative bacilli. Bacterial cultures of all five samples revealed yellow-pigmented colonies of a single aerobic oxidase-positive Gram-negative bacillus (Fig. 1), growing after 18 h at 37°C on blood and chocolate agars but not Drigalski medium, which were subsequently identified as *Sphingobacterium multivorum*. No other aerobic or anaerobic bacterium was isolated. The cefinase test was weakly positive, and antibiotic testing performed on Mueller-Hinton agar revealed susceptibility to amoxicillin-clavulanate, ticarcillin-clavulanate, fluoroquinolones, and trimethoprimsulfamethoxazole but resistance to penicillins, cephalosporins, carbapenems, and aminoglycosides. Biochemical characteristics of the strain determined with an API 20NE system (bioMérieux, Marcy l’Etoile, France) and a Vitek2 system (bioMérieux) corresponded to *S. multivorum* (certainty of 99.9% and 99%, respectively). The identification was also carried out by using matrix-assisted laser desorption ionization–time-of-flight (MALDI-TOF) mass spectrometry (MS) (Bruker Daltonik) showing a spectral score of 2.204 for *S. multivorum* (2). Because of the rarity of this pathogen, identification was confirmed by 16S rRNA gene sequencing. A 1,025-bp 16S rRNA gene fragment corresponding to *Escherichia coli* positions 361 to 1386 was amplified with the primers EhS (5′-TACGGGAGGCAGCTTG-3′) and S15 (5′-GGCGGTTGTAGAAGGGC-3′) (10). The sequence showed 99% identity to the type strain of *S. multivorum* (GenBank AB100738), confirming the identification.

Antibiotic therapy with amoxicillin-clavulanate was maintained for 10 days. The patient’s status improved, norepinephrine was stopped at day 6, and the patient was extubated at day 12. Renal function recovered after 21 days, and renal replacement therapy was stopped. Additional surgical debridement was necessary twice before a cutaneous graft could be performed with success. The patient was discharged to a rehabilitation unit after 7 weeks; she did not suffer from physical sequelae.

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Necrotizing fasciitis is a life-threatening infectious disease characterized by widespread necrosis of the skin, subcutaneous...
tissues, and superficial fascia. It frequently localizes on limbs and is generally due to local wounding. Treatment relies on antibiotic therapy and extensive surgical resection of necrotic tissues. However, the mortality rate of NF remains higher than 30% despite adequate treatment (1). NF is usually due to Gram-positive organisms such as *Streptococcus pyogenes* or *Staphylococcus aureus*. To the best of our knowledge, we report here the first published case of NF related to *S. multivorum*. To rule out any potential misidentification, the strain was identified with three different methods: analysis of biochemical characteristics, mass spectrometry, and 16S rRNA gene sequencing, which gave consistent and reliable results. This shows that MALDI-TOF MS can be used routinely to rapidly and accurately identify colonies of this bacterial species.

*S. multivorum* is a ubiquitous Gram-negative bacillus naturally present in soil, plant material, and water (9). It has been implicated in septicemia in immunocompromised patients (3, 6, 8) and respiratory tract infections in patients with cystic fibrosis (5). Of note, two cases of nonnecrotizing soft tissue infection due to other *Sphingobacterium* species have been reported (7, 11). In the present case, the patient was relatively immunocompromised by long-term steroid treatment (12) and by diabetes mellitus, a well-known risk factor for skin and soft tissue infection (1). Although we could not establish the source of the pathogen, we can speculate that it was either present on the dog’s claw or commensal on patient’s skin. Our case adds NF to the spectrum of *S. multivorum*-related infections and highlights the emergence of Gram-negative bacteria in soft tissue infections in immunocompromised patients (4).

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We report no conflict of interest.

**REFERENCES**