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Skin Infection Caused by Serratia marcescens in a Patient with Diabetes Mellitus

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Serratia marcescens is an uncommon gram-negative bacterium strain that does not cause skin infections in healthy individuals. However, it is rarely reported as the causative agent of infection in immunosuppressed patients or in nosocomial infections. A 51-year-old man was admitted to a hospital presenting with pus and pain that had developed a month ago on a hypertrophic scar area of the back. Although he was on medication for diabetes mellitus, his blood sugar level was poorly controlled. In addition, two months earlier, he received an intralesional injection of 40 mg/mL triamcinolone twice for the hypertrophic scar of the back. *S. marcescens* was identified in the wound culture. His condition improved after ceftriaxone administration, debridement, and split-thickness skin grafts. Although *S. marcescens* is an infrequent cause of skin infections, it is important to remember that it may cause infection in some patients and that the course of the disease may be worse than that in a typical skin infection with poor prognosis.

Key Words: Cutaneous infection, Serratia marcescens

INTRODUCTION

Serratia marcescens is a gram-negative bacterium that belongs to the Enterobacteriaceae family¹. It can usually be found in water, soil, plants, and insects, and it is not a strain that is known to be a causative agent of skin infections in healthy subjects¹. Indeed, it rarely causes infection even in immunosuppressed patients. In addition, it can stick to the surface of medical instruments used for invasive procedures, such as catheters or intravenous tubing. In some cases, it is resistant to disinfection or sterilization, thereby causing noso-comial infections².

To date, there have been reports on lung and genitourinary infection, septicemia, meningitis, wound infection, and keratitis caused by *S. marcescens*³. Skin infections caused by *S. marcescens* can be divided into two types: acute type with cellulitis or intradermal abscess, and chronic type with persistent nodules or repeat cycles of improvement and deterioration⁴.

CASE

A 51-year-old man presented to the hospital with a hard plaque on the back. The lesion occurred after coronary angiography (CAG) that had been performed one year prior to admission. The plaque became harder over time and was associated with itching and slight tenderness. The patient was diagnosed with hypertension and diabetes mellitus in 2003 and was on medication for both conditions.

The lesion had a patch of hyperpigmentation and hypopigmentation, which were presumed to be adverse effects

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of the previous CAG⁵, and a coarse crust was found in the center (Fig. 1). The lesion was sharply demarcated, hard on palpation, and showed no signs of infection, such as erythema, edema, or pus, other than slight tenderness. Biopsy performed (Fig. 2) revealed a hypertrophic scar, and intralesional injection (ILI) of 40 mg/mL triamcinolone was administered every other week to improve symptoms.

On a follow-up visit two months after the last ILI, pus was found in the crust in the middle of the lesion (Fig. 3). The patient stated that pus and pain had occurred one month prior and that the symptoms worsened despite treatment at another hospital. Laboratory tests revealed an elevated level HbA1c level at 12.6%, indicating that diabetes was not controlled. *S. marcescens* was positive in the wound culture, and the results of antibiotic susceptibility tests showed resistance to amoxicillin/clavulanic acid, cefazolin, and cefoxitin, and sensitivity to cefotaxime, ceftazidime, cefepime, and ciprofloxacin. The patient was referred to a plastic surgeon for surgery, and his condition improved after ceftriaxone administration, debridement, and split-thickness skin grafts.



Fig. 1. At the first hospital visit, a mottled pigmented plaque with central crust was identified on the back.



Fig. 3. Two months after the last intralesional injection, the lesion presented as a mottled and erythematous plaque with increased crust.



Fig. 2. (A) There is crust on the epidermis and thick collagen bundles in the dermis with decreased adnexal tissues (H&E, ×40). (B) In the dermis, thick collagen bundles are surrounded by fibroblasts (H&E, ×200).

DISCUSSION

Skin infection caused by S. marcescens is uncommon. However, it can be divided into two types: acute and severe type and chronic type. The acute and severe type is seen in patients with underlying diseases, such as diabetes mellitus or liver cirrhosis, as in the present case, while the chronic type is seen in healthy individuals⁶. Acute and severe cases can present severe ulcers, necrotizing fasciitis, and multiple intradermal abscesses. These do not respond well to treatment with antibiotics alone, therefore surgical treatment is often required⁷. This type of infection is often reported in diabetic patients, since diabetes weakens the immune system. More specifically, in diabetic patients, leukocyte chemotaxis and phagocytosis are reduced; moreover, vascular reaction is also reduced, leading to frequent infection and delayed recovery^{8,9}. The patient in this case also did not respond to antibiotic treatment before visiting a hospital, and the skin defect was already severe at the time of admission. Therefore, surgical treatment was required along with antibiotic treatment.

Among the organisms in the *Serratia* genus, *S. marcescens* is the main pathogen, and, rarely, *S. liquefaciens, S. plymuthica, S. rubidaea, S. odorifera*, and *S. fonticola* can also cause diseases¹⁰. Given that *S. marcescens* may be resistant to many drugs¹¹, antibiotic susceptibility testing must be performed¹². In general, antibiotics, such as third-generation cephalosporins, aminoglycosides, carbapenems, fluoroquinolones, and trimethoprim-sulfamethoxazole, are known to be effective¹³. The present case was resistant to amoxicillin/clavulanic acid and first- and second-generation cephalosporins, such as cefazolin and cefoxitin. However, third- and fourth-generation cephalosporins, such as cefotaxime, ceftazidime, cefepime, and ciprofloxacin, showed sensitivity. Therefore, the patient was placed on ceftriaxone.

Although the patient had an injection of triamcinolone, we presume that the triamcinolone injection did not have a direct effect on the infection, since symptoms occurred a month after the injection. However, it is worth noting that the use of steroid may adversely affect the control of diabetes in some patients and that infections which occur after ILI are relatively more prone to keloid formation than other lesions¹⁴.

This report describes a case of *S. marcescens* skin infection in a patient with uncontrolled diabetes. Although it accounts for a relatively low percentage of cutaneous infections, it has constantly been reported¹⁵. Therefore, it is important to note that it may be the cause of infection in certain patients and that the course may be worse than that of normal skin infections with poor prognoses.

CONFLICT OF INTEREST

In relation to this article, we declare that there is no conflict of interest.

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PATIENT CONSENT STATEMENT

The patient provided written informed consent for the publication and the use of his images.

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