Original article

Staphylococcus simulans osteitis in a diabetic patient

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Abstract

Staphylococcus simulans was identified as the aetiological agent of osteitis in a diabetic woman. Its identifying characteristics and antibiogram were confirmed. Diabetic foot frequently becomes infected and the spread of infection to bone is a major causal factor behind lower-limb amputation. Early diagnosis and appropriate treatment are essential in such cases.

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Keywords: Osteitis; Staphylococcus simulans; Diabetic foot infection

Résumé

Ostéite à Staphylococcus simulans chez une patiente diabétique.

Staphylococcus simulans a été retrouvé comme agent causal d’une ostéite chez une patiente diabétique. L’identification et l’antibiogramme ont été effectués. L’infection du pied est un des facteurs de risque principaux d’amputation chez le diabétique. Un diagnostic précoce et un traitement adapté sont déterminants.

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Mots clés : Ostéite ; Staphylococcus simulans ; Infection du pied du diabétique

1. Introduction

Staphylococcus simulans is a coagulase-negative staphylococcus (C-NS), occasionally found on human skin and in the urethra of healthy women. Its clinical significance has not been well established, as it is rarely identified in association with infection [1]. The present report describes a foot infection in a diabetes patient who subsequently developed osteitis.

2. Case report

A 66-year-old diabetes patient was hospitalized for foot infection and unstable pathology. Six months previously, she had presented with diabetic ulceration that had been successfully controlled by antibiotherapy and local care. Examination revealed no hyperthermia and no wound, but there were local inflammatory signs in the left foot (redness and swelling along the back of the foot). Laboratory tests showed only an elevated erythrocyte sedimentation rate (ESR) of 100 mm/h and a C-reactive protein (C-RP) level of 101 mg/L. Global and differential leucocyte counts were normal. Magnetic resonance imaging (MRI) of the foot revealed several deep abscesses and led to the diagnosis of osteomyelitis. Before surgical debridement, aspiration of the abscesses was carried out with a thin needle and the samples placed in sterile transport tubes and immediately brought to the laboratory.

At the laboratory, Gram-staining of the exudate showed Gram-positive cocci among the leucocytes. The patient was given empirical therapy with gentamicin and amoxycillin–clavulanic acid (AMC). When S. simulans was later identified and its antibiogram confirmed, the AMC was replaced by amoxycillin alone. Gentamicin–amoxycillin was administered intravenously for ten days and then replaced by ofloxacin–rifampin per os for three months.
Cardiac ultrasonography was performed to make absolutely certain that the patient was free of endocarditis. She responded to the combination therapy and after the 3-month treatment, her foot was no longer inflamed, and her CRP levels and ESR had returned to normal.

3. Microbiology

Upon receiving the aspirated samples, they were inoculated into aerobic (Chocolate PolyViteX, bioMérieux, Marcy l’Étoile, France) and anaerobic (Schaezler agar with 5% sheep blood, bioMérieux) media and the plates incubated at 37 °C in 10% carbon dioxide for the aerobic cultures and in an anaerobic chamber for the anaerobic cultures. Two days later, pure cultures were obtained and yielded Gram-positive cocci on Gram-staining. The initial identification of these cocci was based on colony and microscopic morphology, and a negative coagulase test. The cocci were subsequently identified at the species level as S. simulans, a C-NS, using the ID 32 Staph gallery (bioMérieux). This system is based on a series of biochemical reactions and has good specificity [2]. The final profile number was 3461, an “excellent identification” of S. simulans.

Susceptibility testing was performed in accordance with French Society of Microbiology procedures [3]. The isolated culture was found to be susceptible to all antimicrobial agents tested, using the disk-diffusion method, including ampicillin, cefotaxime, cefpodoxime, doxycycline, erythromycin, fosfomycin, gentamicin, kanamycin, linezolid, oxofloxacin, oxacillin, penicillin, rifampin, teicoplanin, trimethoprim–sulphamethoxazole and vancomycin.

4. Discussion

S. simulans belongs to the C-NS, an ubiquitous group of bacteria that colonize human skin. The group includes many species, but most C-NS infections are caused by relatively few microorganisms, such as Staphylococcus epidermidis, Staphylococcus haemolyticus, Staphylococcus hominis and Staphylococcus warneri. These same organisms are the more prevalent C-NS strains found on human skin. The question of whether the number of infections is attributable to a greater degree of virulence or to the enhanced opportunity of these species to cause infection has been raised [4].

However, S. simulans is rarely found on human skin. It is a common animal pathogen and is usually acquired from cattle, sheep and other domestic animals [5] (our patient used to keep her daughter’s dog). A few reports have associated S. simulans with bacteremia, native-valve endocarditis, post-surgical pubic osteomyelitis, prosthetic joint infection and urinary tract infection [1, 5–10]. However, Gé et al. [11] reported that, of the 812 bacteriological specimens from mild-to-moderate diabetic foot infection they examined, 28 strains of S. simulans were isolated. The rarity of reported human infections caused by S. simulans is probably due to the infrequent colonization of human skin by this microorganism or the inability to correctly identify the organism (leading to its classification as “C-NS”), or both.

S. simulans can cause significant infection possibly because of the presence of a capsule, which confers an antiphagocytic effect to this microorganism: the capsule inhibits phagocytosis and contributes to its virulence in studies in vitro [12].

Diabetic foot infections are a major and growing problem. To avoid the selective antibiotic pressure that fosters the development of resistance, most authorities advocate treatment only for clinically infected wounds and the use of the narrowest-spectrum therapy possible [13]. On the other hand, failure to appropriately treat patients with these potentially limb-threatening infections can result in poor outcomes.

Given the present documented case of osteitis caused by S. simulans, we encourage clinicians to obtain proper specimens for culture, and urge clinical microbiology laboratories to report all organisms recovered from such specimens.

5. Conclusion

This case illustrates the importance of identifying C-NS down to the species level, especially in diabetic foot infections. Accurate identification of S. simulans would also help to further define its pathogenic role in human infections.

Disclosure of interest

The authors declare that they have no conflict of interests concerning this article.

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