Case Report

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A case of leg cellulitis caused by multidrug-resistant *Streptococcus pseudoporcinus*

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Summary **A 94-year-old woman was admitted to our hospital with a 5-day history of painful redness in the left lower leg. She was diagnosed with cellulitis and initiated antibiotic therapy with cefazolin. After two days, she presented with an extremely high fever (39.9°C), high C-reactive protein level (256 mg/L; normal, < 3), and signs of disseminated intravascular coagulation. In bacteriological examination, *Streptococcus pseudoporcinus* was detected from her lower leg wound purulence. An antibiogram revealed multidrug resistance except for cefepime, carbapenems, and vancomycin. We changed the antibiotics to cefepime and vancomycin according to the antibiogram and administered immunoglobulin concurrently. As the result of these therapies, her conditions gradually resolved over two weeks. *S. pseudoporcinus*, one of the β-hemolytic Streptococcus species recently described, has been isolated from the genitourinary tract of women. To our knowledge, this is the first case of cellulitis caused by *S. pseudoporcinus*. Typically, most antibiotics indicate adequate drug susceptibilities of *S. pseudoporcinus*, but in our case, multidrug resistance contributed to the prolonged duration of treatment. Because the colonization of *S. pseudoporcinus* in healthy individuals is not rare, it could become an important pathogen in elderly people and in those who have underlying medical conditions, as with other β-hemolytic Streptococci.**

Keywords: Soft tissue infections, streptococcus agalactiae, aged, antibacterial drug resistance

1. Introduction

Streptococci are gram-positive cocci in chain, which traditionally classified by hemolytic pattern on blood agar (α, partial hemolysis, resulting in greenish zone around colonies; β, complete lysis of erythrocytes; and γ, lack of visible hemolysis) and the use of Lancefield group antigens (*e.g.*, *Streptococcus pyogenes*, group A; *Streptococcus agalactiae*, group B) (*1*). Major human streptococcal pathogens belong to pyogenic group of β hemolytic *streptococci* and are classified as Lancefield groups A, B, C or G (*2*). In particular, *S. pyogenes*, commonly known as group A *Streptococcus* (GAS), can cause severe skin or invasive infections including necrotizing fasciitis and streptococcal toxic shock syndrome (*3*). On the other hand, *S. agalactiae* called group B *Streptococcus* (GBS) is the common cause of neonatal sepsis and meningitis because of colonization in the pregnant women (*4*). *Streptococcus pseudoporcinus*, one of the β-hemolytic *Streptococcus* species recently described, has been also isolated from the genitourinary tract of women (*5*). The pathogenicity of *S. pseudoporcinus* remains unknown, except for causing obstetric disorders such as chorioamnionitis and preterm delivery (*6,7*). Previous report described skin infections related with by *S. pseudoporcinus* is only a few, so far (*8*). To our knowledge, this is the first case of cellulitis caused by *S. pseudoporcinus*.

2. Case Report

A 94-year-old woman visited to our hospital with a 5-day history of painful redness in the left lower leg. Physical examination revealed diffuse edema and redness of her lower leg with a high fever (38.5°C) (Figure 1A). She had a long history of foot tinea and

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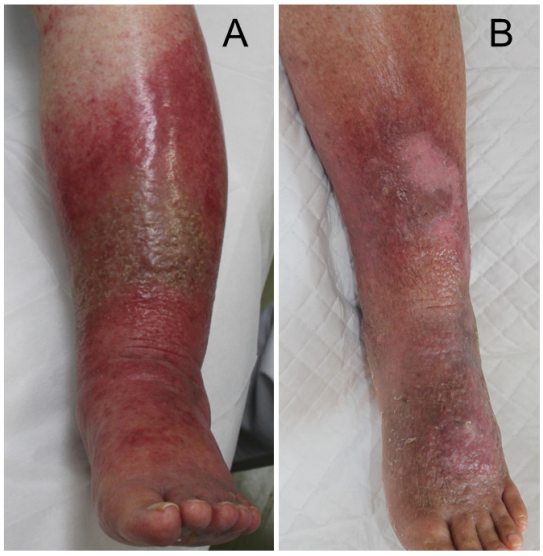

Figure 1. (A) Swelling and redness of the left lower leg on admission. (B) After total 4 weeks treatments, the symptoms were cured with scarring.

Table 1. Drug susceptibility results

Antimicrobial agent	MIC[a] (μg/mL)	Susceptibility[b]
Penicillin	0.5	R
Ampicillin	1	R
Ceftriaxone	2	R
Cefepime	0.5	S
Meropenem	0.12	S
Vancomycin	≤ 0.25	S
Azithromycin	2	R
Clarithromycin	> 4	R
Levofloxacin	> 4	R
Clindamycin	> 0.5	R

[a]MIC, minimum inhibitory concentration. [b]The Clinical & Laboratory Standards Institute (CLSI) interpretive standards for *Streptococcus* spp. β-Hemolytic Group were used.

stasis dermatitis, but no underlying medical problems, except for hypertension. Laboratory examinations revealed moderate elevation of C-reactive protein (CRP; 24 mg/L; normal, < 3). Computed tomography showed no abscesses or abnormal air patterns in the subcutaneous tissue. She was diagnosed with cellulitis based on the above findings and hospitalized our hospital to initiate antibiotic therapy (cefazolin), immediately. After two days, she presented with an extremely high fever (39.9°C), high CRP level (256 mg/L), and signs of disseminated intravascular coagulation (white blood cell count, 10.5×10^9/L; platelet count, 95×10^9/L; prothrombin time/international normalized ratio, 1.18; fibrin degradation products, 20.7 mg/L). In bacteriological examination using VITEK® 2 compact (bioMérieux), *S. pseudoporcinus* was detected by a swab culture from her lower leg wound purulence. An antibiogram revealed multidrug-resistance except for cefepime, meropenem, and vancomycin (Table 1). We changed cefazolin to meropenem according to the antibiogram and administered immunoglobulin concurrently. Because her symptoms persisted despite receiving treatment, after one week, we changed the antibiotics to cefepime and vancomycin. As the result of these therapies, her conditions gradually resolved over two weeks (Figure 1B). Because of disuse syndrome, she was transferred to another rehabilitation hospital. At follow-up after three months, she remains free of symptoms.

3. Discussion

S. pseudoporcinus is a β-hemolytic gram-positive coccus that was identified as pyogenic *Streptococcus* in 2006 (*5*). Because *S. pseudoporcinus* often exhibits cross-reactivity with standard GBS antigen agglutination kits and is normally isolated from the female genitourinary tract, it could be confused with GBS (*7*). Stoner *et al.* (*9*) reported that 5.4% of women had genital cultures that were positive for *S. pseudoporcinus*, which suggests that the colonization of *S. pseudoporcinus* in healthy individuals is not rare. Typically, except for tetracycline, most antibiotics including β-lactam antibiotics, vancomycin, clindamycin, macrolides and fluoroquinolones indicate adequate drug susceptibilities of *S. pseudoporcinus* (*8,10*). In a previous study, a patient with *S. pseudoporcinus* isolated from a skin wound was cured promptly with cephalexin alone (*8*). However, in our case, multidrug resistance in addition to tetracycline contributed to the prolonged duration of treatment. Some GBS with multidrug resistance have been described, especially in Japan (*11*); furthermore, it has been recognized as an important pathogen in elderly people and in those who have underlying medical conditions (*12*). β-lactam resistance in GBS is reportedly due to multiple amino acid substitutions found in some penicillin-binding proteins (13). It is unknown what caused multidrug resistance in our case, however, since *S. pseudoporcinus* has some microbiological similarities to GBS, it may be likely to acquire multidrug resistance similarly.

In conclusion, we described the first case of cellulitis caused by *S. pseudoporcinus*. Owing to multidrug resistance and her advanced age, we took more time to treatment in this case. Therefore, we should keep in mind that *S. pseudoporcinus* could emerge as a serious medical problem in the near future as with other β-hemolytic *streptococci*.

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