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CORRESPONDENCE

Simultaneous infection in a couple by Panton-Valentine leukocidin-positive methicillin-susceptible *Staphylococcus aureus* related to the USA300 clone

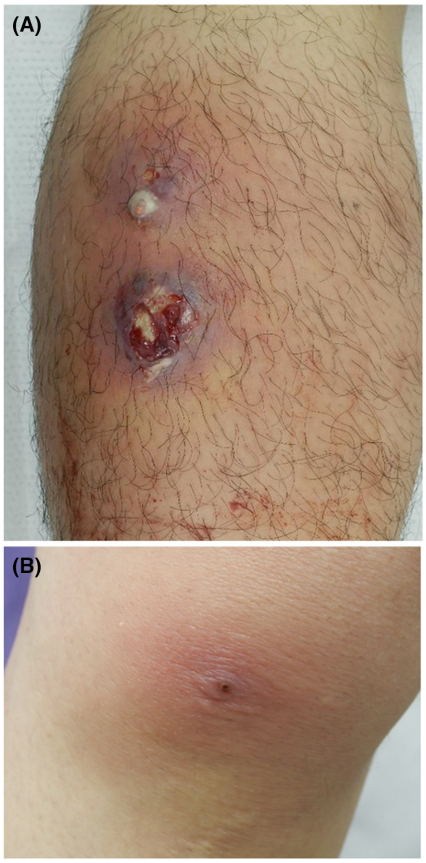
Panton–Valentine leukocidin (PVL), a pore-forming toxin associated with severe skin and soft tissue infections (SSTIs), is produced by *Staphylococcus aureus*, especially methicillin-resistant (MRSA) strains, such as the USA300 clone.[1] Reports of recurrent and familial SSTIs caused by the USA300 clone have been increasing in Japan.[2] PVL is also produced by methicillin-susceptible *S. aureus* (MSSA),[3] but PVL-positive MSSA has rarely been found in Japan. We report two patients with SSTI caused by PVL-positive MSSA. The patients were healthcare workers living together whose symptoms appeared almost on the same day.

One patient was a 21-year-old male without an underlying disease. Four days before his initial visit, painful erythema with an abscess and ulceration appeared on his left thigh (Figure 1A). Furunculosis was diagnosed, so the abscess was incised and he was hospitalized. From the presentation and the simultaneous onset of multiple lesions, PVL-positive MRSA was suspected, and intravenous minocycline 200 mg/day was administered. His symptoms improved, and he was discharged after 8 days. A pus culture grew MSSA. Minocycline was continued orally for an additional 6 days, resulting in cure.

The other patient was a 24-year-old female with a history of atopic dermatitis. Pain and erythema developed on her right upper arm 5 days before her initial visit. She presented with pustules and a 3-cm, painful red nodule on her right upper arm. Furunculosis was diagnosed. The nodule was incised, and cephalexin 1500 mg/day was administered. The treatment was switched to minocycline with PVL-positive MRSA in mind but was discontinued owing to dizziness. A pus culture was positive for MSSA. Cephalexin was resumed for 14 days. Sixteen days later, a painful indurated erythema appeared on the right knee (Figure 1B) and was punctured and treated with cephalexin for 9 days until it improved.

The MSSA strains isolated from both patients were resistant to gentamicin, erythromycin, and levofloxacin (Figure 1C). Except for β-lactam antibiotics, they resembled the USA300 clone in terms of their susceptibility.[4] Molecular epidemiological analyses by PCR, pulsed-field gel electrophoresis, and multilocus sequence typing revealed that the MSSA isolates were identical and had a genotype similar to that of the USA300 clone (Figure 1D).

The isolated bacterium was PVL positive. The simultaneous onset is a clue to the suspicion of PVL. Both patients were medical workers, so one of them might have brought the bacteria home. While not identical to the USA300 clone, the causative organism shared molecular features with it. The USA300 clone and related strains are extremely infectious and refractory to treatment. Type I arginine catabolic mobile element (ACME) is thought to be involved in their infectivity.[5] There are few reports of genetic analysis of PVL-positive MSSA, and



(C)

Antibiotics	MIC (mg/L)	Result
PCG	>8	R
MPIPC	1	S
ABPC	>8	R
SBT/ABPC	8	S
IPM/CS	≤1	S
CEZ	≤1	S
CMZ	≤4	S
GM	>8	R
EM	>4	R
CLDM	≤0.25	S
MINO	≤1	S
VCM	1	S
TEIC	≤1	S
DAP	0.5	S
LVFX	4	R
LZD	2	S
ST	≤10.0	S
RFP	≤0.5	S

(D)

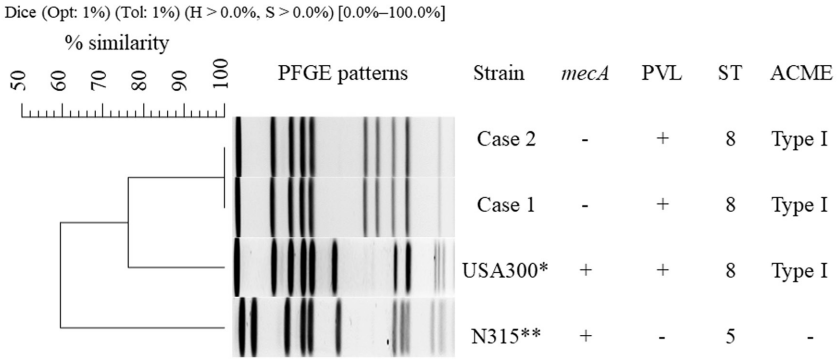


FIGURE 1 (A) Lesion on the left thigh of the male patient showing painful erythema with an abscess and ulcer. (B) Lesion on the right knee of the female patient showing painful indurated erythema with papule. (C) Antimicrobial susceptibility test results. ABPC, ampicillin; CEZ, cefazolin; CLDM, clindamycin; CMZ, cefmetazole; DAP, daptomycin; EM, erythromycin; GM, gentamicin; IPM/CS, imipenem/cilastatin; LVFX, levofloxacin; LZD, linezolid; MINO, minocycline; MPIPC, oxacillin; PCG, penicillin G; R, resistant; RFP, rifampicin; S, susceptible; SBT/ABPC, sulbactam/ampicillin; ST, sulfamethoxazole–trimethoprim; TEIC, teicoplanin; VCM, vancomycin. (D) Molecular epidemiological features of the MSSA strains isolated in this study: pulsed-field gel electrophoresis analysis of case 2 isolate, case 1 isolate, USA300 clone reference strain (*JCSC6774), and typical hospital-acquired MRSA strain (**N315). ACME, arginine catabolic mobile element; *mecA*, methicillin resistance gene; PVL, Panton–Valentine leukocidin; ST, sequence type.

it is unclear how closely PVL-positive MSSA is related to the USA300 clone. Thus, further research is needed to determine the relationship between these strains. Meanwhile, the possibility of a PVL-positive strain should be kept in mind when treating SSTIs caused by MSSA.

KEYWORDS
antimicrobial susceptibility, furuncle, furunculosis, Panton-Valentine leukocidin, *Staphylococcus aureus*

CONFLICT OF INTEREST
The authors declare no conflict of interest.

ETHICS STATEMENT
Approval of the research protocol: N/A.
Informed consent: The patients provided informed consent for the publication of the images submitted with this article.
Registry and registration No: N/A.
Animal Studies: N/A.

Takuo Murakami MD[1]
Naohiko Aozasa MD, PhD[1]
Yoshika Suzuki MD[1]
Tomoka Togo MD[1]
Kyohei Miyano MD, PhD[1]
Hiroshi Kaneko[2]
Hidemasa Nakaminami PhD[2]
Yuichiro Tsunemi MD, PhD[1]
Koichiro Nakamura MD, PhD[1]

[1]*Department of Dermatology, Saitama Medical University, Saitama, Japan*
[2]*Department of Clinical Microbiology, School of Pharmacy, Tokyo University of Pharmacy and Life Sciences, Tokyo, Japan*

Correspondence
Naohiko Aozasa, Department of Dermatology, Saitama Medical University, 38 Morohongo, Moroyama-machi, Iruma-gun, Saitama 350-0495, Japan.
Email: naozasa@saitama-med.ac.jp

ORCID

Naohiko Aozasa https://orcid.org/0000-0001-6583-6560
Kyohei Miyano https://orcid.org/0000-0003-2467-8388

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