IDCases 8 (2017) 77–80

Contents lists available at ScienceDirect

IDCases

journal homepage: www.elsevier.com/locate/idcases

Case report

Toxic shock syndrome due to community-acquired methicillin-resistant *Staphylococcus aureus* infection: Two case reports and a literature review in Japan

Ryuichi Sada[a,*], Saori Fukuda[b], Hiroyasu Ishimaru[c]

[a] Department of General Internal Medicine, Kameda Medical Center, 929 Higashi-cho, Kamogawa, Chiba, 296-8602, Japan
[b] Department of Clinical Pathology, Tenri Hospital, 200 Mishima-cho, Tenri, Nara, 632-8552, Japan
[c] Department of General Internal Medicine, Tenri Hospital, 200 Mishima-cho, Tenri, Nara, 632-8552, Japan

ARTICLE INFO

Keywords:
Community-acquired methicillin-resistant *Staphylococcus aureus*
Toxic shock syndrome
Menstruation
Vulvar lichen sclerosus

ABSTRACT

Community-acquired methicillin-resistant *Staphylococcus aureus* has been spreading worldwide, including in Japan. However, few cases of toxic shock syndrome caused by Community-acquired methicillin-resistant *Staphylococcus aureus* have been reported in Japan. We report 2 cases, in middle-aged women, of toxic shock syndrome due to Community-acquired methicillin-resistant *Staphylococcus aureus* via a vaginal portal of entry. The first patient had used a tampon and the second patient had vaginitis due to a cleft narrowing associated with vulvar lichen sclerosus. Both patients were admitted to our hospital with septic shock and severe acute kidney injury and subsequently recovered with appropriate antibiotic treatment. In our review of the literature, 8 cases of toxic shock syndrome caused by Community-acquired methicillin-resistant *Staphylococcus aureus* were reported in Japan. In these 8 cases, the main portals of entry were the skin and respiratory tract; however, the portal of entry of Community-acquired methicillin-resistant *Staphylococcus aureus* from a vaginal lesion has not been reported in Japan previously.

Introduction

Methicillin-resistant *Staphylococcus aureus* (MRSA) strains are well known to be hospital-associated or healthcare-associated pathogens. However, within the past two decades, the incidence of infections due to community-acquired methicillin-resistant *S. aureus* (CA-MRSA) strains have been rapidly increasing worldwide [1]. Similar to hospital-acquired MRSA (HA-MRSA), CA-MRSA can cause severe infections such as soft-tissue infection (including necrotizing fasciitis), necrotizing pneumonia, severe sepsis, and disseminated infection [2]. Moreover, *S. aureus* can produce many exotoxins such as toxic shock syndrome toxin-1 (TSST-1) and staphylococcal enterotoxin B (SEB). Exotoxins of *S. aureus* are associated with a severe illness that includes shock and multiple organ failure and is called toxic shock syndrome (TSS) [3]. Specifically, in women of childbearing age, an insanitary ectocervical environment (e.g., long-term tampon-use or post-partum period) is associated with bacterial growth, including the growth of *S. aureus,* and the risk of TSS [4].

We herein report 2 cases of TSS due to CA-MRSA in Japanese women. A literature review of cases from Japan revealed that transvaginal invasion is a very rare portal of entry of CA-MRSA. The population of CA-MRSA in Japan is relatively low compared with that in other countries. Despite this fact, we assert that the initiating treatment for TSS with vancomycin and clindamycin, even in Japan.

Informed consent was obtained from the patients for the publication of their respective case reports.

Case report

Case 1. A 46-year-old Japanese woman was admitted to our hospital after a 1-day history of fever, shaking chills, and diarrhoea. She previously was seen at another clinic on the same day of admission (day 1), and fosfomycin was prescribed. However, her symptoms worsened. She did not have any relevant past history and had not been prescribed any medications. She had never been abroad, and she had not eaten any raw foods in the previous month.

Her vital signs on the day of admission were as follows: blood pressure, 67/47 mmHg; heart rate, 118 beats per minute; body temperature, 39.4 °C; respiratory rate, 30 breaths per minute; and peripheral capillary oxygen saturation level on room air, 98%. With respect to her consciousness, she was alert. Physical examination

* Corresponding author.
E-mail address: sadametal@gmail.com (R. Sada).

http://dx.doi.org/10.1016/j.idcr.2017.04.012
Received 21 October 2016; Received in revised form 2 April 2017; Accepted 10 April 2017

showed capillary refilling time of 12 s, and generalized rash on her chest and abdomen. Results of cardiovascular, respiratory, and abdominal examinations were normal. Laboratory data revealed white blood cell (WBC) count of 12,300/μl, C-reactive protein (CRP) level of 15.4 mg/dL, blood urea nitrogen (BUN) of 26.4 mg/dL, serum creatinine (s-Cre) level of 3.3 mg/dL, serum total protein level of 7.1 g/dL, serum albumin level of 3.4 g/dL, and procalcitonin level of 69.8 ng/mL. Results of liver function tests were normal except for a lactate dehydrogenase (LDH) level of 328 IU/L. Urine dipstick examination revealed 2+ protein and 2+ occult blood. A microscopic examination detected 5–10 red blood cells (RBCs) per high-power field and 5–10 WBCs per high-power field.

At first, we diagnosed severe bacterial colitis and hypovolemic shock and started large volumes of hydration, dopamine infusion, and intravenous ciprofloxacin (300 mg, 2 times daily). However, her vital signs did not recover. On day 2, we learned that she had begun menstruating 4 days prior to admission, and that she kept a tampon inserted 3 days until the day of admission. Additional testing of her vaginal discharge showed the following; polymorphonuclear leukocytes 2+, and Nugent score, 1. We suspected TSS or septic shock of unknown origin and changed the antibiotics to vancomycin (1 g, 2 times daily, intravenously), clindamycin (600 mg, 4 times daily, intravenously), and meropenem (500 mg, 4 times daily, intravenously). On day 4, community-acquired *S. aureus* was detected from the tampon and vaginal discharge and her vital signs gradually recovered enough to stop the dopamine infusion, and her diarrhoea stopped. Two sets of blood culture and urine culture were negative. We diagnosed staphylococcal TSS owing to tampon use, discontinued meropenem on day 11, and continued antibiotic treatment with the combination of vancomycin and clindamycin for 14 days. On day 14, the patient was found to have peeling skin at the end of her fingers (Fig. 1). The patient was discharged on day 18, without any damage to her organs or deterioration in activities of daily living.

Case 2. A 40-year-old Japanese woman was admitted to our hospital after a 5-day history of yellowish vaginal discharge, and 3-day history of fever, shaking chills, and appetite loss. She did not have any relevant past medical history and had not been prescribed any medications, including antibiotics. She had never been abroad and had not had any raw foods in the previous month. Her last menstrual period had finished 2 weeks before the day of hospital admission.

Her vital signs on the day of admission were as follows: blood pressure, 86/49 mmHg; heart rate, 121 beats per minute; body temperature, 39.8 °C; respiratory rate, 36 breaths per minute; and peripheral capillary oxygen saturation level on room air, 96%. She was alert and physical examination showed generalized rash on her hand

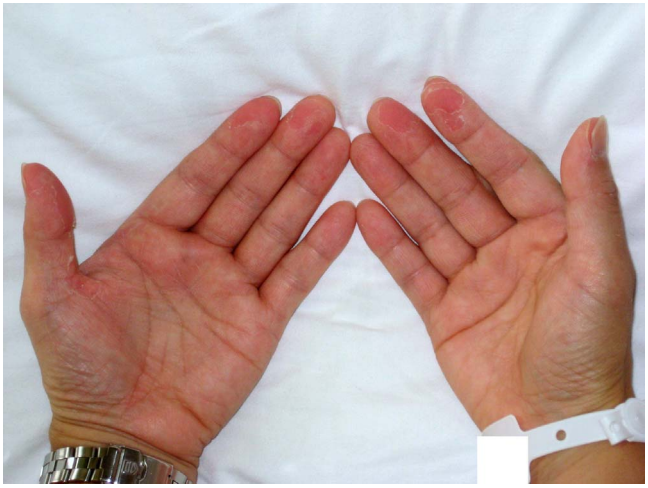

Fig. 1. Case 1: Peeling of the fingertips.

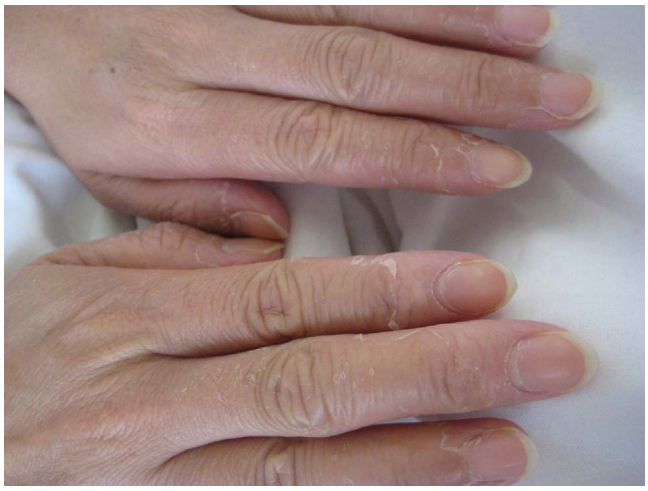

Fig. 2. Case 2: Peeling of the fingertips.

and neck. Results of cardiovascular, respiratory, and abdominal examinations were normal, except tenderness on the right costal-vertebral angle. Laboratory data revealed WBC of 19,200/μl, CRP level of 14.5 mg/dL, BUN level of 28.4 mg/dL, s-Cre level of 1.7 mg/dL, serum total protein level of 6.0 g/dL, serum albumin level of 3.3 g/dL, and procalcitonin level of 5.4 ng/mL. Results of liver function tests were normal except for an LDH level of 328 IU/L. Urine dipstick examination revealed 3+ protein and 2+ occult blood. A microscopic examination detected 5 to 10 RBCs per high-power field and more than 100 WBCs per high-power field. Testing of her vaginal discharge showed the following: polymorphonuclear leukocytes, 4+; and Nugent score, 4. Gram stain of both urine and vaginal discharge showed clustered gram-positive cocci.

At first, we diagnosed severe urinary tract infection and septic shock. We started large volumes of hydration, dopamine infusion, and intravenous ampicillin (2 g, 3 times daily) and gentamicin (120 mg, once daily). However, her vital signs did not recover and she experienced diarrhoea. On day 2, *S. aureus* was detected from urine and vaginal discharge. We suspected staphylococcal TSS or septic shock of unknown origin, and changed the antibiotics to vancomycin (1 g, 2 times daily, intravenously), clindamycin (600 mg, 4 times daily, intravenously), and meropenem (1 g, 3 times daily, intravenously) for covering enteric bacteria and anaerobes like *Bacteroides* spp. On day 3, community-acquired *S. aureus* was detected from both urine and vaginal discharge, and she recovered adequately enough to discontinue dopamine and large volumes of hydration. Two sets of blood cultures were negative. Gynaecological examination revealed narrowing of the vaginal opening caused by vulvar lichen sclerosus, a chronic and progressive dermatologic disorder of genital skin that can cause vulvar pruritus, dysuria, and sexual dysfunction due to cleft narrowing [5]. We diagnosed staphylococcal TSS caused by vaginitis and discontinued meropenem on day 9 and continued vancomycin in combination with clindamycin for 14 days. On day 14, we noted peeling skin at the end of her fingers (Fig. 2). The patient showed full recovery and was discharged on day 17.

Microbiological test

The following 13 antimicrobials were tested: ampicillin, cefazolin, imipenem, gentamicin, gentamicin, erythromycin, clindamycin, telithromycin, levofloxacin, minocycline, vancomycin, teicoplanin, arbekacin, and trimethoprim/sulfamethoxazole. According to M100-S20, published by the Clinical and Laboratory Standards Institute [6], the isolates from Case 1 and Case 2 were resistant to ampicillin, cefazolin, imipenem, and gentamicin, but were susceptible to erythromycin, clindamycin, and minocycline. The 2 isolates were tested for genes