CASE REPORT

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Decubitus ulcer infection and bacteremia due to tazobactam/piperacillin-resistant *Veillonella parvula*

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ABSTRACT

This is the first case report of decubitus infection and bacteremia due to *Veillonella parvula* (*V. parvula*). A patient in his 70s with pre-existing diabetes mellitus was admitted with decubitus infection, and tazobactam/piperacillin treatment was initiated. Tazobactam/piperacillin-resistant *V. parvula* was detected in the blood and decubitus site cultures. The antimicrobial treatment was changed to clindamycin and cefmetazole. Antimicrobial therapy was administered for 28 days. The patient was transferred to a convalescent hospital. *V. parvula* occasionally causes infection in immunocompromised patients with underlying diseases, such as diabetes. An appropriate evaluation by culture test is important for diagnosis, treatment, and recurrence prevention. Tazobactam/piperacillin is often used in the treatment of multi-bacterial infections such as decubitus infections. *V. parvula* may be resistant to tazobactam/piperacillin, and this possibility should be taken into account when administering treatment.

Keywords: *Veillonella parvula*, bacteremia, decubitus infection, tazobactam/piperacillin

Abbreviations:
V. parvula: *Veillonella parvula*
TAZ/PIPC: tazobactam/piperacillin
CLDM: clindamycin
MNZ: metronidazole
MIC: minimum inhibitory concentration

INTRODUCTION

Veillonella parvula (*V. parvula*) is an obligate anaerobic Gram-negative coccus. It is a part of the human oral and urogenital flora and is also found in the upper respiratory and intestinal tracts.

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Risk factors for *V. parvula* infection include periodontal disease and immunodeficiency, which causes meningitis,[1] osteomyelitis,[2] spinal discitis,[3] epidural abscesses,[4] infective endocarditis,[5] and bacteremia.[6-8] To our knowledge, there are no existing case reports on bacteremia from a decubitus ulcer infection caused by *V. parvula*. *V. parvula* is generally treatable with beta-lactams, metronidazole (MNZ), and clindamycin (CLDM).[9] But several studies have reported that *V. parvula* is resistant to tazobactam/piperacillin (TAZ/PIPC) and MNZ.[8,10] In this report, we describe a patient with a decubitus ulcer infection caused by TAZ/PIPC-resistant *V. parvula* bacteremia.

CASE

This study was reviewed and approved by the Ethics Committee of Kariya Toyota General Hospital (approval number 839). As the patient had dementia, written informed consent was obtained from the patient's family to publish the anonymized information.

The patient was a male in his 70s with pre-existing diabetes mellitus, a traumatic subarachnoid hemorrhage, cholecystitis, and Alzheimer's dementia. He was in a convalescent hospital and received treatment for a decubitus ulcer in his sacral region. The patient commenced levofloxacin treatment for fever on day X–30. On day X–18, incision and drainage of the decubitus ulcer

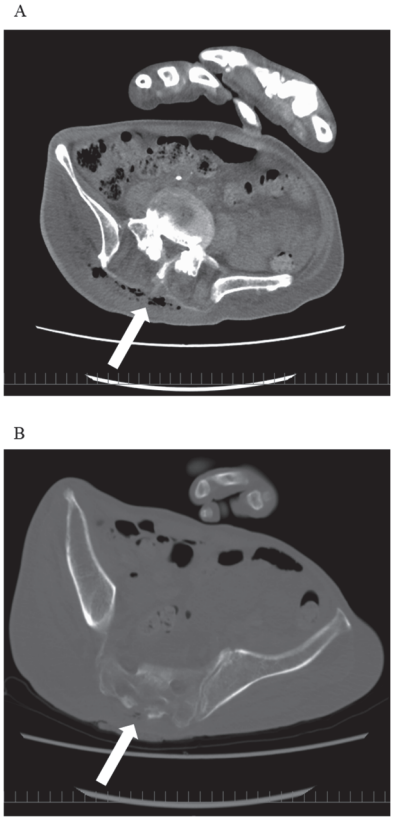

Fig. 1 Computed tomography image on day X
Fig. 1A: Air was observed in the median subcutaneous region of the buttock (arrow).
Fig. 1B: Osteolytic changes in the sacrum (arrow).

were performed, and meropenem was initiated. *Enterococcus faecalis* was detected in the wound culture, and meropenem was switched to vancomycin. His body temperature was elevated again on day X–3; on day X, generalized systemic edema worsened, and oliguria was observed. TAZ/PIPC was administered, and the patient was transferred to our hospital on suspicion of sepsis. On admission, the patient's physical examination revealed a body temperature of 37.8 °C, blood pressure of 105/68 mmHg, pulse rate of 105 beats/min, and percutaneous arterial blood oxygen saturation in the 80% range. The decubitus ulcer in his sacral region that the previous physician had debrided had copious amounts of yellow necrotic tissue, complete circumferential pocket formation, and large amounts of purulent drainage. Computed tomography revealed subcutaneous air (Fig. 1A) from below the sacrum to near the lamina propria and within the muscles of the left thigh; the sacrum was osteolytic (Fig. 1B).

There were large-volume bilateral pleural effusions and prominent generalized edema. His oral hygiene was poor. Laboratory results showed no significant abnormal findings on urinalysis, with a high white blood cell count of 13,500/μL, neutrophils at 86.0%, and a C-reactive protein of 14.89 mg/dL. He had acute renal failure with a serum creatinine level of 1.26 mg/dL and urea nitrogen of 43.6 mg/dL. The serum albumin level was 1.4 g/dL, resulting in severe hypoalbuminemia. The patient was taking saxagliptin 2.5 mg. However, his glycemic control was poor, with a serum glucose of 166 mg/dL and hemoglobin A1c of 8.1%. A decubitus ulcer infection was diagnosed in the absence of other findings suggesting a source of infection. Blood, urine, and decubitus ulcer fluid cultures were obtained. TAZ/PIPC (13.5 g/day) was initiated on the assumption of *Enterobacterales* and obligate anaerobes because the decubitus ulcer infection was in the sacral region. On day X+1, Gram-negative cocci were detected in the blood cultures, and on day X+2, they were identified as *V. parvula* by using matrix-assisted laser desorption/ionization-time-of-flight mass spectrometry (MALDI Biotyper, Bruker Daltonics, Bremen, Germany).

The patient was in a poor general condition with decreased urine output. Gram-negative rods (4+) and a few cluster-like Gram-positive cocci were observed on Gram staining of the decubitus ulcer. MNZ (1,500 mg/day) was added to the TAZ/PIPC treatment because *V. parvula* may have a higher minimum inhibitory concentration (MIC) for TAZ/PIPC.[8,9] Daptomycin (350 mg/every 48 hours) was added for the cluster-like Gram-positive cocci. On day X+3, the culture of the decubitus ulcer revealed the presence of extended-spectrum β-lactamase-producing *Escherichia coli* (*E. coli*), methicillin-susceptible *Staphylococcus aureus* (*S. aureus*), and *Streptococcus constellatus* (*S. constellatus*). Daptomycin was discontinued because anti-methicillin-resistant *S. aureus* agents were unnecessary. On day X+5, the susceptibility of *V. parvula* was revealed (Table 1), and the MIC of TAZ/PIPC for *V. parvula* was high (MIC ≥ 32 μg/mL). The patient's fever resolved on day X+5, and blood tests showed improvement in the white blood cell and neutrophil counts. The course of the disease suggested that MNZ would be effective. MNZ susceptibility testing for *V. parvula* could not be performed. Therefore, the patient was switched to CLDM, which was found to be effective against *V. parvula* based on the results of susceptibility testing. CLDM was also effective for methicillin-susceptible *S. aureus* detected in the decubitus ulcer. Cefmetazole (1 g/day) was commenced against extended-spectrum β-lactamase-producing *E. coli* detected in the decubitus ulcer. On the day of admission, *V. parvula* was detected in the blood culture but not in the culture of the decubitus ulcer. The slide of the purulent decubitus ulcer drainage was rechecked on day X+6, and Gram-negative cocci were present (Fig. 2). We checked the Anaero Columbia RS blood agar medium (Becton, Dickinson and Company, Franklin Lakes, New Jersey, USA) again on day X+6 and found new suspected *V. parvula* colonies (Fig. 3); it was confirmed as *V. parvula* using matrix-assisted laser desorption/ionization-time-of-flight mass spectrometry.

Transthoracic echocardiography was performed to rule out infective endocarditis and showed no apparent vegetation. The decubitus ulcer had formed a pocket that was more than 8 cm deep.

Table 1 Antimicrobial susceptibility of *Veillonella parvula*

Antimicrobials	Minimum inhibitory concentration (μg/mL)
Ampicillin	4
Cefmetazole	32
Ceftriaxone	8
Meropenem	≤0.25
Clavulanate/Amoxicillin	4
Tazobactam/Piperacillin	>32
Gentamicin	>8
Clindamycin	≤0.25
Minocycline	≤1
Levofloxacin	>4
Vancomycin	>8

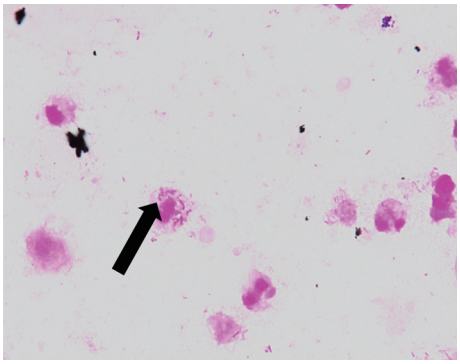

Fig. 2 Gram-stained image of cultures from the decubitus ulcer site
Phagocytic images of Gram-negative cocci are visible (arrow). ×1000.

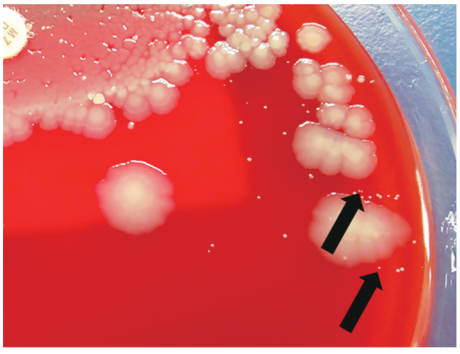

Fig. 3 Blood agar medium of the decubitus ulcer culture
Anaero Colombia RS blood agar medium (day X+6) showing small white colonies of *Veillonella parvula* (Becton, Dickinson, and Company) (arrows).

However, the hemoglobin and platelet counts were 6.8 g/dL and 72,000/μL, respectively, and hypoalbuminemia was observed; the patient was treated with debridement and clearing of the necrotizing tissue to the greatest extent possible without additional incisions. Magnetic resonance imaging was not used to diagnose osteomyelitis in this case. The reason was that the patient's prognosis was determined to be poor because of the progression of disuse syndrome, even though the decubitus ulcer infection was well controlled. On day X+28, the inflammatory findings at the decubitus ulcer had improved, and the purulent discharge had ceased. Blood tests revealed an improvement in white blood cell counts (4,900/μL), neutrophils (63.1%), and C-reactive protein (2.12 mg/dL). All antimicrobials were discontinued. The patient was transferred to a convalescent hospital to continue the treatment.

DISCUSSION

In this instance, *V. parvula* was present in the intestinal tract, and fecal contamination of the decubitus ulcer caused bacteremia. The multiple different colonies that formed from the culture medium at the decubitus ulcer indicated multiple bacterial infections. Detecting *Veillonella* spp. in cultures may be difficult because of the presence of other rapidly developing species.

Veillonella spp. are obligate anaerobic bacteria that appear as small colonies and require strict anaerobic conditions for development.[11] The colonies of *V. parvula* in the decubitus ulcer culture (Fig. 3) were very similar to those of *S. constellatus*, and *V. parvula* could not be detected. We suspected bacteremia from decubitus ulcer infection because *V. parvula* was detected in the blood culture, and smear specimens from the decubitus ulcer (Fig. 2) showed findings suspicious of Gram-negative cocci. On day 6 of incubation, the decubitus ulcer culture was rechecked; *V. parvula* had formed colonies and was identified using matrix-assisted laser desorption/ionization-time-of-flight mass spectrometry.

In immunocompromised patients with underlying diseases such as diabetes mellitus, *Veillonella* spp. can be a true pathogen. The accurate assessment of various cultures and re-testing is essential for appropriate clinical diagnosis, treatment, and recurrence prevention.

Source control is essential in treating decubitus ulcer infections[12]; however, in this case, the patient was severely anemic with a low platelet count and hypoalbuminemia. Therefore, resection of the pocket was difficult, and only cleaning and debridement were performed as appropriate.

The MIC of CLDM to *V. parvula* was low in this instance, and CLDM was generally considered to be of therapeutic use. As the course of the disease improved, CLDM was selected against *V. parvula* and methicillin-susceptible *S. aureus*. Cefmetazole was selected against extended-spectrum β-lactamase-producing *E. coli*, in addition to CLDM.[13]

Obligate anaerobes are generally treatable with TAZ/PIPC or meropenem; however, the MIC of TAZ/PIPC to *V. parvula* may be high, as observed in previous reports.[8,10] *V. parvula* lacks a Clinical and Laboratory Standards Institute MIC standard; this study conducted susceptibility testing by using a highly versatile susceptibility test panel. MICs for anaerobic bacteria were used as a proxy for evaluation.

The patient had a history of diabetes mellitus, was undernourished, and immunocompromised. The previous use of multiple antimicrobial agents may have resulted in alterations in the microbiota, thus leading to *V. parvula* bacteremia, which is usually considered unlikely to cause severe infections. Proactively collecting wound cultures is recommended when an infection is suspected during decubitus ulcer management. If blood culture results contradict wound culture results, reassessing the Gram stain to identify the source of infection is important for optimal treatment and recurrence prevention.

In conclusion, this is the first report of a decubitus ulcer infection resulting in *V. parvula* bacteremia. It indicates that when treating multi-bacterial infections, doctors should remember that severe infections may be caused by bacteria that are resistant to TAZ/PIPC.

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Author contributions

Shoko Sahara, Teruhisa Kinoshita, and Tomomi Amano: writing of the original draft.

Misa Ishida, Takashi Yamakita, and Norio Takimoto: review and editing.

Keisuke Oka: supervision.

All authors have met the ICMJE authorship criteria and have given final approval for the submission of the final version.

Conflicts of interest

None.

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REFERENCES

1 Bhatti MA, Frank MO. *Veillonella parvula* meningitis: case report and review of *Veillonella* infections. *Clin Infect Dis.* 2000;31(3):839–840. doi:10.1086/314046.

2 Singh N, Yu VL. Osteomyelitis due to *Veillonella parvula*: case report and review. *Clin Infect Dis.* 1992;14(1):361–363. doi:10.1093/clinids/14.1.361.

3 Gouze H, Noussair L, Padovano I, et al. *Veillonella parvula* spondylodiscitis. *Med Mal Infect.* 2019;49(1):54–58. doi:10.1016/j.medmal.2018.10.001.

4 Chen YC, Ko PH, Yang CJ, et al. Epidural abscess caused by *Veillonella parvula*: Case report and review of the literature. *J Microbiol Immunol Infect.* 2016;49(5):804–808. doi:10.1016/j.jmii.2014.05.002.

5 Pérez-Jacoiste Asín MA, Fernández-Ruiz M, Serrano-Navarro I, Prieto-Rodriguez S, Aguado JM. Polymicrobial endocarditis involving *Veillonella parvula* in an intravenous drug user: case report and literature review of *Veillonella* endocarditis. *Infection.* 2013;41(2):591–594. doi:10.1007/s15010-012-0398-3.

6 Strach M, Siedlar M, Kowalczyk D, Zembala M, Grodzicki T. Sepsis caused by *Veillonella parvula* infection in a 17-year-old patient with X-linked agammaglobulinemia (Bruton's disease). *J Clin Microbiol.* 2006;44(7):2655–2656. doi:10.1128/JCM.00467-06.

7 Li J, Chen P, Li J, Gao X, Chen X, Chen J. A new treatment of sepsis caused by *Veillonella parvula*: A case report and literature review. *J Clin Pharm Ther.* 2017;42(5):649–652. doi:10.1111/jcpt.12559.

8 Al-Otaibi FE, Al-Mohizea MM. Non-vertebral *Veillonella* species septicemia and osteomyelitis in a patient with diabetes: a case report and review of the literature. *J Med Case Rep.* 2014;8:365. doi:10.1186/1752-1947-8-365.

9 Veloo AC, van Winkelhoff AJ. Antibiotic susceptibility profiles of anaerobic pathogens in the Netherlands. *Anaerobe.* 2015;31:19–24. doi:10.1016/j.anaerobe.2014.08.011.

10 Maraki S, Mavromanolaki VE, Stafylaki D, Kasimati A. Surveillance of antimicrobial resistance in recent clinical isolates of Gram-negative anaerobic bacteria in a Greek University Hospital. *Anaerobe.* 2020;62:102173. doi:10.1016/j.anaerobe.2020.102173.

11 Delwiche EA, Pestka JJ, Tortorello ML. The *veillonellae*: gram-negative cocci with a unique physiology.

Annu Rev Microbiol. 1985;39:175–193. doi:10.1146/annurev.mi.39.100185.001135.

12 Livesley NJ, Chow AW. Infected pressure ulcers in elderly individuals. *Clin Infect Dis.* 2002;35(11):1390–1396. doi:10.1086/344059.

13 Matsumura Y, Yamamoto M, Nagao M, et al. Multicenter retrospective study of cefmetazole and flomoxef for treatment of extended-spectrum-β-lactamase-producing *Escherichia coli* bacteremia. *Antimicrob Agents Chemother.* 2015;59(9):5107–5113. doi:10.1128/AAC.00701-15.