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Pseudomonas putida bacteremia due to soft tissue infection contracted in a flooded area of central Taiwan: a case report

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In areas of flooding, soil bacteria could infect humans. We report a 78-year-old woman who developed *Pseudomonas putida* soft tissue infection associated with bacteremia after passing through the water of a flooded area. She recovered very well after a 14-day course of intravenous ceftazidime therapy. Physicians should be alert to soft tissue pseudomonae infection during the flooding season.

Key words: *Pseudomonas putida*, risk factors, soft tissue infections

Pseudomonas spp. are Gram-negative bacilli that can infect patients in the water flooding area, and have the potential to produce severe infections. *Pseudomonas putida* is a metabolically versatile saprophytic soil bacterium. Sequence analysis of the 6.18 Mb genome of *P. putida* strain KT2440 revealed diverse transport and metabolic systems [1]. Although there is a high level of genome conservation with the pathogenic pseudomonad *Pseudomonas aeruginosa* (85% of the predicted coding regions are shared), key virulence factors including exotoxin A and type III secretion systems are absent. Pseudomonads are ubiquitous bacteria that belong to the γ subclass of the Proteobacteria. *P. putida* strain KT2440 [2,3] is among the best-characterized saprophytic pseudomonads that has retained its ability to survive and function in the environment.

We report a 78-year-old woman who lived at the water flooding area, and had had an episode of *P. putida* soft tissue infection associated with bacteremia.

Case Report

A 78-year-old female lived at Yun-Lin County, one of the water-flooded areas during August 2004. She was quite well previously and denied any underlying diseases. She suffered from erythematous swelling over bilateral lower legs after passing through floodwaters 2 days before the admission. Fever was also present in the following days. She was brought to the emergency room of Changhua Christian Hospital, Changhua on August 13, 2004. Tracing her history showed no other special exposures or travel. During the previous 6 months, there was no *P. putida* outbreak in central Taiwan. Upon admission, she was afebrile, with a low blood pressure of 80/56 mm Hg, and she had erythematous swelling over bilateral lower legs (Fig. 1). Admitting laboratory data

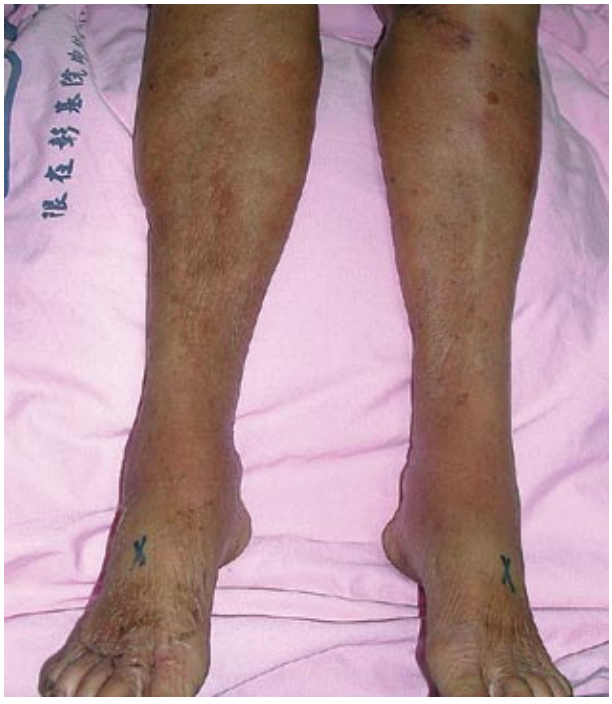

Fig. 1. The *Pseudomonas putida*-infected patient presented with erythema and swelling over the bilateral lower legs.

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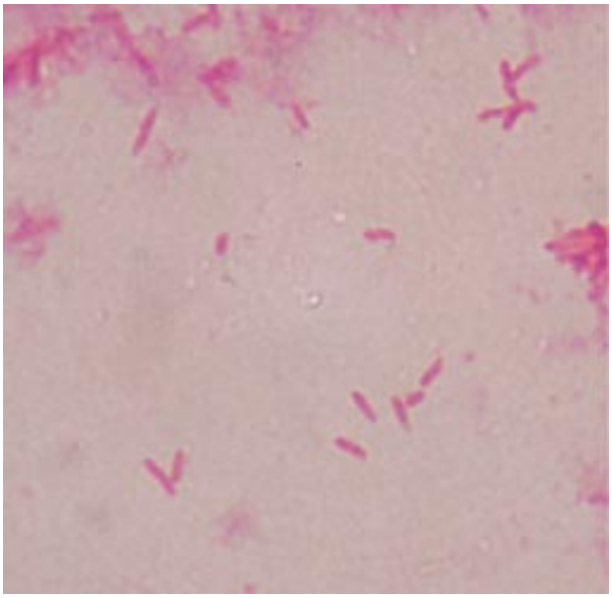

Fig. 2. Gram stain of *Pseudomonas putida* isolated from the blood specimen showed Gram-negative bacilli.

Fig. 3. Colonies of *Pseudomonas putida* grown on blood agar plate and eosin methylene blue agar.

included a white blood cell count of 11,700/mm^3, a hematocrit of 35.6%, a platelet count of 14,300/mm^3, a C-reactive protein of 22.4 mg/dL, a blood urea nitrogen level of 10.9 mg/dL, and a creatinine level of 0.7 mg/dL. A chest X-ray obtained on admission showed cardiomegaly with bilateral interstitial infiltration, and pleural effusion. The initial impression was soft tissue infection.

Initially, we used intravenous penicillin to treat the soft tissue infection. On the second hospital day, a preliminary blood culture report showed Gram-negative bacillus (Fig. 2). The organism was grown on blood agar plate and eosin methylene blue agar (Fig. 3), and it was identified with an API 20NE strip (BioMérieux, Durham, NC, USA). The biochemical reaction showed positive oxidase test, alkaline/alkaline reaction on tripe-sugar iron agar, positive arginine dihydrolase test, and positive fluorescent reaction. The code of API 20NE system showed 0140455 (identification value 84.7%, confidence value 0.94). The Phoenix system showed confidence value 97%. Therefore, the criteria for *P. putida* were met [4]. Susceptibility testing using the disk diffusion method revealed that the isolate was sensitive to piperacillin, ceftazidime, cefpirome, meropenem, gentamicin, amikacin and ciprofloxacin, and resistant to amoxicillin-clavulanate and trimethoprim-sulfamethoxazole. On the third hospital day, we exchanged the penicillin to ceftazidime for better coverage of the *Pseudomonas* spp. according to the preliminary microbiological data.We continued ceftazidime because of good clinical response afterwards.

During the hospitalization, serial blood and wound microbiologic studies were negative for *P. putida*. Her condition improved gradually. She completed a 14-day course of ceftazidime and serial follow-up laboratory data became normalized. She was discharged 14 days later. As far as we know, during this period, there was no *P. putida* outbreak in central Taiwan, and this may have been a sporadic case.

Discussion

Our patient complicated with bacteremia illustrates the evidence for the pathogenic potential of *P. putida*. Furthermore, *P. putida* was one of the most common species of the CDC WO-2 (Centers for Disease Control Weak Oxidizer Group 2) isolates to be recovered from blood, which suggested an increased potential for this particular species to cause invasive diseases [5]. The possibility of bacterium arising from the environment had to be considered; however, we had not identified any other cases of *P. putida* infection in patients from central Taiwan. Tracing her history, the route of entry of *P. putida* was from the soft tissue while she walking across the flooded area. *Pseudomonas* spp. have been recovered from clinical specimens, particularly from patients with chronic lung disease, as well as environmental samples. To our knowledge, there are only rare clinical descriptions of infections caused by the *P. putida*.

Unlike *P. aeruginosa*, *P. putida* is usually not considered as a pathogen, for either plants or animals [1]. The genomic structure of *P. putida* has been extensively analyzed [6-9]. Nelson et al reported that *Pseudomonas* spp. have figured prominently in efforts to become invasive *P. putida* strains [1]. Reviewing the literature revealed limited previous clinical reports of *P. putida* bacteremia [10], indicating the rarity of our case. Yang et al mentioned that imipenem and ceftazidime were more effective in this indication than other antibiotics [11].

We believe that *Pseudomonas* will be recognized increasingly as a pathogen in disabled patients. Because of this organism's unique characteristics and ability to produce serious infections, vigilance for *P. putida* should be maintained during times of flooding.

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