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A RARE CASE OF CUTANEOUS ULCER CAUSED BY PSEUDOMONAS PUTIDA

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ABSTRACT
Cutaneous ulcers are commonly caused by bacterial infections, most frequently Staphylococcus aureus. However, infection caused by Pseudomonas putida is extremely rare in humans. Pseudomonas putida is a gram-negative, obligate aerobic bacterium widely found in soil, water, and moist environments and is generally considered non-pathogenic. Nevertheless, under certain conditions, it may act as an opportunistic pathogen and cause infection, particularly in the presence of open wounds or environmental exposure. This report describes a rare case of a cutaneous ulcer caused by Pseudomonas putida in a 26-year-old male laborer. The patient presented with multiple painful ulcers with erythematous edges and purulent discharge on the anterior and lateral regions of the left foot. The lesions initially developed after minor trauma caused by a plant prick while working in a rice field. Laboratory investigations including pus culture revealed growth of Pseudomonas putida without fungal infection. Antibiotic susceptibility testing showed sensitivity to amikacin, gentamicin, and meropenem. The patient was treated with oral ciprofloxacin, topical gentamicin, analgesics, and saline compresses, resulting in gradual clinical improvement with resolution of the ulcers and residual hyperpigmented macules.

Keywords: cutaneous ulcer; opportunistic infection; pseudomonas putida; skin infection

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INTRODUCTION

Pseudomonas species are Gram-negative aerobic bacteria widely distributed in environmental sources such as soil and water. Among them, Pseudomonas putida is generally considered a low-virulence environmental organism but has increasingly been recognized as an opportunistic pathogen in humans. Although infections caused by P. putida are relatively rare, several reports have documented its association with bloodstream infections and skin and soft tissue infections, particularly in immunocompromised or hospitalized patients (Salabei et al., 2020; Singh et al., 2021).

Clinical manifestations of P. putida infection vary and may include cellulitis, bacteremia, and sepsis. Cases of cellulitis accompanied by P. putida bacteremia have been described in patients with underlying conditions such as autoimmune hepatitis and chronic illnesses, suggesting that impaired host immunity may predispose individuals to infection (Ono et al., 2024). In addition, bacteremia related to skin and soft tissue infections has been reported as a rare but significant clinical presentation of this organism (Rowe et al., 2025).

Several studies have also highlighted that environmental Pseudomonas species can cause invasive infections following disruption of the skin barrier. Reports of P. putida bacteremia in pediatric patients and other vulnerable populations further support its role as an emerging opportunistic pathogen (Picollo et al., 2023). Similar findings have been described in cases of cellulitis-associated bacteremia caused by related Pseudomonas species, emphasizing the pathogenic potential of these environmental bacteria when introduced into susceptible hosts (Mori et al., 2023; Reis et al., 2025).

Pseudomonas putida rarely causes disease, but can be opportunistic, causing various diseases, especially in patients with weakened immune systems, severe burns, or as a result of contaminated medical devices. Under normal conditions, this bacterium does not cause infection in humans and actually plays a positive role in the biodegradation of organic compounds. Pseudomonas putida can form biofilms that function as a protective layer of polysaccharides that shield the bacteria from the immune system, hinder antibiotic penetration, and enable chronic colonization. These biofilms cause opportunistic infections to persist and become difficult to treat. The type and severity of symptoms depend on tissue penetration. This disease can be misinterpreted as cellulitis, especially in patients with immunocompromised conditions or open wounds exposed to contaminated environments. (Kakurai M, 2025). This case report aims to describe a rare case of cutaneous ulcer caused by Pseudomonas putida following minor environmental trauma and to emphasize the importance of microbiological examination in establishing an accurate diagnosis and appropriate management.

METHOD

This study was conducted using a case report approach describing the clinical presentation, diagnostic evaluation, microbiological findings, and treatment of a patient with a cutaneous ulcer caused by Pseudomonas putida. The patient was examined at the Dermatology and Venereology Clinic of Prof. Dr. Chairuddin Panusunan Lubis (CPL) Hospital, Medan. Data collection was carried out through clinical history taking, physical examination, dermatological examination, and supporting laboratory investigations. A detailed medical history was obtained from the patient, including the onset of the lesion, history of trauma, occupational exposure, previous treatments, and associated systemic symptoms. A comprehensive physical examination was performed to evaluate the patient's general condition and vital signs. Dermatological examination was conducted to assess the morphology, number, distribution, and characteristics of the skin lesions, including the presence of erythema, ulceration, necrotic tissue, and purulent discharge.

Laboratory investigations were performed to determine the causative organism and to exclude other differential diagnoses. A complete blood count and blood glucose test were conducted to evaluate the patient's systemic condition and rule out underlying metabolic disorders. Microbiological examination was performed using pus samples collected from the ulcer base under sterile conditions. The specimens were sent to the microbiology laboratory for bacterial culture, identification, and antibiotic susceptibility testing. Culture samples were incubated using standard microbiological techniques to detect the presence of aerobic and anaerobic bacteria as well as fungal organisms. Identification of bacterial isolates was conducted using Gram staining and microscopic examination to determine bacterial morphology and characteristics. Antibiotic susceptibility testing was performed to determine the sensitivity of the isolated organism to commonly used antimicrobial agents. The results of microbiological analysis revealed the presence of gram-negative rod-shaped bacteria identified as Pseudomonas putida. Antibiotic susceptibility testing showed that the isolate was sensitive to amikacin, gentamicin, and meropenem.

Based on clinical and laboratory findings, the patient was treated with systemic and topical antimicrobial therapy. The therapeutic regimen consisted of oral ciprofloxacin 500 mg twice daily for 14 days, topical gentamicin applied twice daily to the affected area, paracetamol 500 mg three times daily for pain management, and 0.9% sodium chloride compresses applied three times daily for 15 minutes. The patient was followed up periodically to evaluate clinical response, wound healing, and the resolution of symptoms. Clinical outcomes were assessed through serial dermatological examinations during follow-up visits. Improvements were evaluated based on reduction of inflammation, decreased purulent discharge, drying of the ulcer, and the appearance of post-inflammatory hyperpigmented macules indicating healing of the lesions.

RESULT

A 26-year-old male working as a casual laborer presented to the Dermatology and Venereology Clinic of Prof. Dr. CPL Hospital, Medan, with complaints of thickened blackish lesions and wounds containing fluid and pus on the left foot that had appeared one month prior to the visit. The lesions initially developed after the patient was pricked by a plant while working in a rice field four months earlier. The initial lesion appeared as a small painless nodule which was ignored by the patient. Over time, the lesion gradually enlarged and additional nodules developed around the affected area. Within three months, the nodules became swollen, inflamed, and eventually ruptured, releasing foul-smelling purulent discharge. General physical examination revealed that the patient was in good condition with normal vital signs. Dermatological examination demonstrated multiple ulcers with erythematous borders measuring approximately 0.5–2 cm in diameter, accompanied by purulent discharge and necrotic black crusts located on the anterior and lateral regions of the left foot (Figure 1). Based on the clinical presentation, the initial differential diagnoses included scrofuloderma, gangrenous ulcer, and deep mycosis.

Figure 1. Patient first visit showed multiple ulcers with erythematous edges, varying between 0,5-2cm, pus (+) on the anterior and lateral regions of the left foot.

Laboratory investigations were performed to identify the underlying cause of the lesions. Complete blood count and blood glucose examinations were within normal limits, indicating the absence of systemic infection or underlying metabolic disorders such as diabetes mellitus. Microbiological examination was conducted by collecting pus samples from the ulcer base and performing bacterial culture and identification. Fungal culture showed no fungal growth, thereby excluding deep mycosis as a possible diagnosis. Further microbiological analysis revealed the growth of Pseudomonas putida, a gram-negative rod-shaped bacterium. Microscopic examination with Gram staining showed gram-negative rods with monotrichous flagella under 1000× magnification (Figure 2). Antibiotic susceptibility testing demonstrated that the bacterial isolate was sensitive to amikacin, gentamicin, and meropenem. These findings confirmed that the cutaneous ulcer was caused by *Pseudomonas putida* infection.

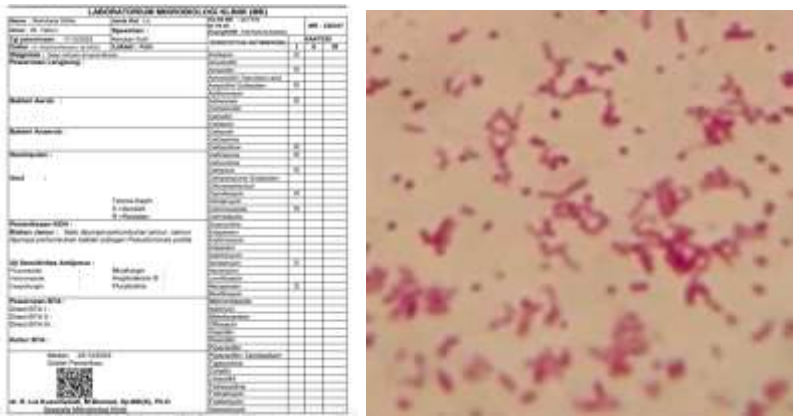

Figure 3. (A). Identification of bacteria and antibiotic sensitivity testing (B). Microscopic image magnified 1000x with Gram staining shows gram-negative rod-shaped bacteria, medium in size, with monotrichous flagella.

The patient was subsequently treated with oral ciprofloxacin 500 mg twice daily for 14 days, along with topical gentamicin applied twice daily, paracetamol 500 mg three times daily, and 0.9% NaCl compresses applied three times daily for 15 minutes. During follow-up examination, gradual clinical improvement was observed. The purulent discharge decreased, inflammation subsided, and the ulcer began to dry. After approximately two months of treatment and follow-up, the lesions showed significant improvement, leaving residual hyperpigmented macules with mild erythematous borders (Figure 3).

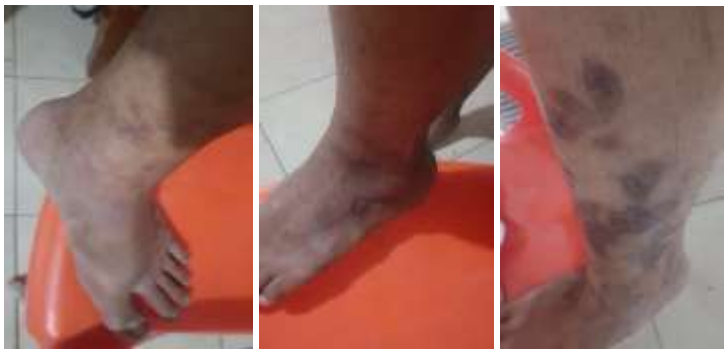

Figure 4. Clinical improvements after 2 months over therapy

The findings in this case highlight the importance of considering rare opportunistic pathogens in patients presenting with chronic or atypical skin ulcers, particularly when there is a history of environmental exposure or trauma. In this patient, the infection likely occurred following minor trauma caused by a plant prick while working in a rice field, allowing environmental bacteria present in soil or water to enter the skin.

DISCUSSION

The patient's diagnosis was established based on medical history, physical examination, dermatological examination, and supporting tests that had been performed. The patient is a 26-year-old male, employed as a casual laborer, with complaints of thickened black spots and wounds containing fluid and pus for the past month. These complaints initially appeared after he was pricked by plants in a rice field. A small lump appeared four months ago, but it was not painful, so the patient ignored it because it did not cause any discomfort. Over time, the lump grew larger and new lumps appeared nearby. Then, within 3 months, the lump swelled, became inflamed, and ruptured, releasing foul-smelling pus. The patient was diagnosed with scrofuloderma, gangrenous ulcer, and deep mycosis. Scrofuloderma is cutaneous tuberculosis with secondary manifestations preceded by a primary infection. Scrofuloderma occurs due to continuous spread from organs under the skin due to Mycobacterium infection, most often originating from the lymph nodes, but can also originate from joints, tendons, synovial fluid, and bones. The clinical picture is grouped or solitary lymphadenitis without pain. Pseudomonas putida is an environmental Gram-negative bacterium capable of inducing significant immune and tissue disruptions in infected hosts, highlighting its potential role as an opportunistic pathogen. (Abdel-Rahman A.N, 2024)

In these cases, there is no history of productive cough lasting more than 2 weeks, and the patient has never taken OAT previously. Gangrenous ulcers, also known as diabetic ulcers, are associated with a history of diabetes and represent a complication of angiopathy in diabetic patients. (Lou J, 2025) In this case, there were no systemic symptoms, history of fever, diabetes (negative), or hypertension (negative). The patient was initially diagnosed with deep mycosis or sporotrichosis due to ulcerative lesions on the feet; however, fungal culture examinations did not reveal any fungal growth, thus ruling out all differential diagnoses. (Rowe, 2025). Pseudomonas species, including Pseudomonas putida, are environmental bacteria capable of colonizing water and soil and may act as opportunistic pathogens causing tissue damage and ulcerative lesions in infected organisms. (Aboyadak I.M, 2024). Pseudomonas aeruginosa is an opportunistic bacterium that can cause various skin infections

due to its virulence factors and ability to colonize damaged skin tissue. (Alkheeqani B, 2024).

Opportunistic pathogenic Pseudomonas species are commonly found in aquatic environments, including bathing ponds, where they may pose a potential risk for infection in humans.(Baudišová D. (2025). Although commonly found in the environment, Pseudomonas putida has been reported as an opportunistic pathogen associated with various clinical infections. (Baykal H, 2022). Coinfection involving Pseudomonas putida has been reported in critically ill patients, highlighting its role as an opportunistic pathogen in vulnerable hosts. (Birlutiu V, 2023). Rare Pseudomonas species have been reported as causative agents of cellulitis and bloodstream infection, especially in vulnerable patients. (Böhm L, 2024).

Pseudomonas putida is an obligate aerobic, rod-shaped, gram-negative, motile bacterium that is non-spore-forming and non-encapsulated. It is commonly found in soil, water, and on plant surfaces and can survive in extreme environments. Its colonies are pink in color when examined microscopically on agar media. (Alzahrani OM, 2022). Infections caused by uncommon Pseudomonas species may present as cellulitis and can progress to bloodstream infection in certain patients. (Furuya K, 2025).

Soft-tissue wounds can serve as an entry point for environmental bacteria such as Pseudomonas putida, which in rare cases may lead to systemic infection including bacteremia.(El H, 2023). Environmental Pseudomonas species, although uncommon human pathogens, may cause severe systemic infection when introduced through damaged skin or percutaneous routes. (Kohno H, 2023). Recent molecular investigations have identified Pseudomonas putida as an emerging pathogen with notable antimicrobial resistance, indicating its increasing relevance in infectious diseases. (Mallick TT, 2025).

Management consists of standard supportive care and antimicrobial therapy. Systemic antibiotic administration generally includes penicillin G (or similar beta-lactams) or clindamycin (an agent capable of penetrating damaged tissue and inhibiting toxin synthesis). (Rowe, 2025). Although uncommon, Pseudomonas putida has been implicated in severe infections in hospitalized patients, reflecting its opportunistic pathogenic potential. (Mokhtar M.N, 2022).

CONCLUSION

This case report highlights a rare cutaneous ulcer caused by Pseudomonas putida following minor trauma. Microbiological examination was essential to confirm the diagnosis and guide appropriate antibiotic therapy, resulting in significant clinical improvement.

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