



Diabetic Foot Due to *Aeromonas Hydrophila* and *Pseudomonas Oryzihabitans*: A Case Report

Aeromonas Hydrophila ve *Pseudomonas Oryzihabitans*'ın Yol Açtığı Diabetik Ayak: Olgu Sunumu

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Abstract

Foot infections are the most common cause of amputations in diabetic patients. The main predisposing reasons for the development of foot ulcers and subsequent infection in diabetic patients are sensory neuropathy, vascular insufficiency and immune system abnormalities due to hyperglycemia. Limb-threatening infections are often polymicrobial. *Staphylococcus aureus*, group B streptococci, enterococci and facultative gram-negative bacilli are the most common pathogens. Here, we present two cases of diabetic foot infected by extremely rare microorganisms: *Aeromonas hydrophila*, and *Pseudomonas (Flavimonas) oryzihabitans*. *Turk Jem* 2014; 18: 100-102

Key words: Diabetic foot, *aeromonas hydrophila*, *pseudomonas (flavimonas) oryzihabitans*

Özet

Diabetik hastalarda ayak enfeksiyonları en sık amputasyon nedenidir. Ayak ülseri ve ardından enfeksiyon gelişmesinde başlıca hazırlayıcı nedenler sensitif nöropati, vasküler yetmezlik ve hiperglisemi nedeniyle immun sistem anormallikleridir. Ekstremiteleri tehdit eden enfeksiyonlar genellikle *Staphylococcus aureus*, Group B streptokoklar, enterokoklar ve fakültatif Gram negatif basiller gibi polimikrobial etkenlerdir. Burada biz çok nadir olarak diabetik ayak nedeni olan *Aeromonas hydrophila*, and *Pseudomonas (Flavimonas) oryzihabitans* ile enfekte olmuş 2 olguyu sunduk. *Turk Jem* 2014; 18: 100-102

Anahtar kelimeler: Diabetik ayak, *aeromonas hydrophila*, *pseudomonas (flavimonas) oryzihabitans*

Introduction

Foot infections are one of the most important causes of morbidity and even mortality in diabetic patients. They are also the most frequent cause of nontraumatic limb amputations. Major risk factors for foot ulceration and infection in diabetic patients are peripheral sensory neuropathy causing unawareness of thermal, mechanical, and chemical traumas; motor and autonomic neuropathy related to new pressure points on foot; disturbed microcirculation, new arteriovenous shunts, tissue hypoperfusion, decreased humidity of the skin resulting in fissures; hyperglycemia, resulting in immunocompromised milieu; foot deformities, previous amputations or ulcer, and vascular insufficiency (1,2,3). Aerobic gram-positive cocci, especially *Staphylococcus aureus* and *Streptococcus* are the most common pathogens responsible from this devastating complication of diabetes mellitus. Chronic and ulcerated lesions generally have polymicrobial nature, including enterocci, enterobacteriaceae,

obligate anaerobes and gram-negative bacilli. The most frequent gram-negative bacilli in these lesions are *P. aeruginosa*, *Klebsiella* spp., *E.coli*, *P. Mirabilis* (4).

Aeromonas hydrophila is a facultative anaerobic, non-spore forming gram-negative bacillus found in soil and water. It usually causes self-healing gastroenteritis with diarrhea, sometimes fever, nausea and vomiting, especially by consumption of contaminated water and food in summer. *Aeromonas hydrophila* may also cause severe skin and soft tissue infections such as cellulitis, necrotising fasciitis due to contact with contaminated water following a trauma. It may also cause bacteremia, sepsis, pneumonia, pulmonary abscess, endocarditis, peritonitis and meningitis in patients with concomitant serious diseases (5,6). There are a limited number of reports in the literature regarding diabetic foot (7,8).

Pseudomonas (Flavimonas) oryzihabitans is an aerobic, non-spore forming gram-negative rod found in moist environments and soil. This organism rarely cause nosocomial and community-

acquired infections in human, such as surgical wound infections (9), peritoneal dialysis catheter infections (10), endophthalmitis (11), sepsis (12), soft tissue infections (13), bacteremia, pneumonia, biliary tract infection, and subdural empyema (14).

In this paper, we present two diabetic patients with infections caused by *Aeromonas hydrophila* and *Pseudomonas oryzihabitans* which are extremely rare agents as a cause of diabetic foot.

Case Reports

Case 1

A 55-year-old woman, who had a history of type 2 diabetes mellitus for 20 years, had been managed by hemodialysis for one year. She was admitted to hospital because of pain, reddening at the third toe on the left foot following a nail trauma four days ago. Oral antibiotic therapy was started, but there was no response despite 4-5 days of treatment. The patient was referred to our hospital. Physical examination revealed a diabetic foot showing necrosis, purulent drainage, erythema and edema in the left third toe classified as grade 4 according to Wagner's classification (Figure 1).

Following hospitalisation, a culture was obtained from pus under the necrotic tissue. Empirical antibiotic therapy was initiated with imipenem 500 mg/day IV. There was no fever. *Aeromonas hydrophila* was isolated at the culture and the antibiotic was switched to piperacillin-tazobactam 6.75 g/day IV according to antibiogram sensitivity test. A few days later, finger amputation was performed. The wound healed in two weeks following the operation.

Case 2

A 59-year-old man who had a history of type 2 diabetes mellitus for 20 years was admitted to our hospital because of pain, reddening and pus drainage at the first toe on the right foot (Figure 2). Parenteral antibiotic therapy (ciprofloxacin and clindamycin) was started empirically, and the wound started to improve gradually. An X-ray showed osteomyelitis. He was classified as grade 3 according to Wagner's classification. *Pseudomonas (flavimonas) oryzihabitans* was isolated from the wound. It remains unclear how the patient was exposed to the microorganism. The wound completely healed in two months.



Figure 1. Grade 4 (Wagner's Classification) diabetic foot in Case 1

Discussion

Diabetic foot infections may present as paronychia, ulcer, localised cellulitis, myositis, abscess, necrotising fasciitis, septic arthritis, tendinitis, osteomyelitis, and gangrene. Our patients showed localised gangrene and soft tissue infection (Patient 1, Wagner's classification grade 4) and osteomyelitis, and abscess formation (Patient 2, grade 3).

Aeromonas hydrophila may very rarely cause serious soft tissue infections, pneumonia, meningitis, endocarditis, osteomyelitis and septic arthritis in immunocompromised people with cancer, chronic hepatitis, diabetes mellitus, organ transplantation, cirrhosis and chronic renal failure. Soft tissue infections by this microorganism may vary from mild cellulitis to necrotising fasciitis progressing to myonecrosis and sepsis. Osteomyelitis or soft tissue infections may result from exposure of the skin to contaminated water/soil after a minor or major trauma (5,6,15,16). In the literature, there is a reported case of ecthyma gangrenosum caused by *Aeromonas hydrophila* in a diabetic patient (7).

In patient 1, a nail trauma and following contamination resulted in infection. *Aeromonas hydrophila* is an anaerobic microorganism, and in hypoxic conditions, it may progress rapidly; surgical drainage and debridement of the necrotic area is usually necessary. In our patient, the third toe of the right foot was amputated because of necrosis.

Some destructive enzymes, such as hemolysin, dnase, and peptidase are produced by *Aeromonas hydrophila* and these enzymes are related to necrosis (e.g. myonecrosis). Larka et al. reported five patients who were infected by *Aeromonas hydrophila*, and in whom, clinical symptoms started 40 hours after trauma (15). Our patient experienced these symptoms within the first 24 hours. In summary, if rapid progression of soft tissue infection is seen following trauma and there is contact with soil or water, *Aeromonas hydrophila* may be suspected as the responsible organism. Patient 1 had chronic renal failure and diabetes mellitus which may both cause susceptibility to infections. In the literature, there is a reported case of a diabetic patient with renal failure presenting with necrotizing fasciitis and gas gangrene due to this microorganism (8).

Most *Aeromonas* spp. are resistant to penicillins and their derivatives and sensitive to carbapenem, third generation



Figure 2. Grade 3 (Wagner's Classification) diabetic foot in Case 2

cephalosporins, chloramphenicol, quinolon and trimethoprim-sulphametoxazole. In our patient, *Aeromonas hydrophila* isolated from pus culture was semisensitive to ciprofloxacin and sensitive to all other antibiotics.

Aeromonas hydrophila is the dominant component of normal intestinal flora of leeches. It provides proteolytic enzymes needed for ingestion of red blood cells. Flap and replantation infections treated by leeches that cause infections due to *Aeromonas hydrophila* have been reported (17,18).

Flavimonas oryzihabitans is an aerobic, gram-negative rod and is found in water, soil and moist environments. *Flavimonas oryzihabitans* may rarely cause infections in human beings, and usually is seen in immunocompromised patients and in those having foreign materials, such as indwelling catheters. It may cause surgical wound infections, peritonitis and nasocomial infections (9,19,20,21). Sometimes it can cause severe infections, such as splenic abscesses in diabetic patients (22). In our patient, localized soft tissue and bone infection was improved by antibiotic (ciprofloxacin and clindamycin) treatment.

In summary, we present, to the best of our knowledge, the first case of diabetic foot infected by *Pseudomonas oryzihabitans* and, another extremely rare case infected by *Aeromonas hydrophila*; as a frightening complication in diabetic patients.

Conflicts of Interest

There are no conflicts of interest.

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