Case Study

Rare pathogen *Pseudomonas stutzeri*: A case report from Kathmandu, Nepal

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Abstract

Pseudomonas stutzeri is widespread opportunistic pathogen that has been isolated from various clinical specimens. Here, we described the case of a women falling in manhole with deformity and pain on her right ankle. There was difficulty in walking and painful swelling observed around her ankle. Cefixime was given as therapeutic purpose; the condition was improved. Further few days later the patient again complained with the previous problem. The patient was diagnosed with *Pseudomonas stutzeri* infection and recovered completely upon amikacin therapy.

Keywords: Amikacin; Manhole; Opportunistic pathogen; *Pseudomonas stutzeri*

INTRODUCTION

Pseudomonas stutzeri is a Gram negative, non-fluorescent, motile rod with monotrichous flagella, aerobic bacteria with denitrifying characteristics (1). It is widely distributed, non-fermenting saprophyte that can bloom in a wide variety of habitats (soil, water and hospital environments) (2, 3). The first history on *P. stutzeri* was stated on the note of C.B. van Niel and M.B. Allen in 1952 as a nitrate reducer. The bacteria was named after the bacteriologist Dr. A. Stutzeri who originally described the species. In the 1966, the species *P. stutzeri* was proposed by Mandel. Later on in 1985 Burri and Stutzer describe it as widespread organism with unique characteristics. These strain are nutritionally versatile and have specific metabolic properties. Furthermore, some strain are naturally transformable. There are 17 genomovars with G+C content of genomic DNA lies between 60 to 66 mol% (4).

The organism is usually nonpathogenic, but it is an opportunistic pathogen and sometime considered as contamination (5). Several reports have been described for the isolation of *P. stutzeri* from the clinical and pathological materials since 1956 (6). The first documented case of *P. stutzeri* was liberated in nonunion fracture of a tibia in 1973 (4). Since then, several cases of *P. stutzeri* have been reported in different infection; bacteremia/septicemia; bone infection ie fracture infection, joint infection, osteomyelitis and arthritis; endocarditis; eye infection i.e. endophthalmitis and panophthalmitis; meningitis; pneumonia; skin infection i.e. ecthyma gangrenosum; urinary tract infection and ventriculitis (7). Several serious and fatal infection have been reported worldwide, among the cases reported above, two cases are resulted into death. The cases of infection is concern typically in poor health condition or immunocompromised and elderly with underlying diseases or previous surgery

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(4). It is infrequently isolated from clinical specimens, if isolated they are more likely to represent colonization or contamination rather than infection (6).

CASE

A 50-year-old woman visited Ortho-department of Manmohan Memorial Community Hospital on 1st February 2017 by fall injury in a manhole with deformity and pain on her right ankle. The rest of the physical examinations were normal and she denied any previous illness. But, there was painful swelling around the ankle and difficulty during walking. On physical examination, her weight was 60 kg, body temperature 37ºC (98ºF), pulse 70 beats/min and blood pressure 150/100 mm Hg. However, on the third day the condition was worsen, admitted to hospital and the patient was diagnosed with *P. stutzeri* infection on microbiological examination of pus. Following cefixime (250mg bd) therapy for seven days the patient condition was improved and discharged as her wish. Further, few days later the patient again visited the department with reappearance of previous problems and pus sample further processed to identify microbial etiology. The *P. stutzeri* infection was diagnosed and patient undergone amikacin therapy (250mg bd) for five days. On 14th day the patient was recovered completely.

LABORATORY FINDINGS

Laboratory studies revealed slightly increased total leukocyte count with mild neutrophilia and low hemoglobin. Other blood cell parameters were found in acceptable range. The biochemical parameters were also within reference range. The rapid immunochromatographic test for HIV, HBV and HCV were found non-reactive.

MICROBIOLOGICAL FINDINGS:

Pus sample was collected for bacteriological cultivation. The sample was aseptically inoculated into Blood agar, Mac-Conkey agar and Chocolate agar and was incubated for next 24 hours at 37ºC. After overnight incubation, reddish brown wrinkled colonies were appeared. For better demonstration, the colonies were transferred on the Nutrient agar and incubated aerobically for next 24 hours. The fresh colonies on nutrient agar were unusual in shape and consistency with adherent, wrinkled appearance, elevated ridges and no pigmentation.

Different conventional biochemical test were performed and result noted for general identification i.e. catalase test, oxidase test, triple sugar iron agar test, sulfide indole motility, urea hydrolysis, citrate utilization test, nitrate reduction test, OF test, decarboxylase test (lysine, arginine, ornithine), starch hydrolysis test and gelatin hydrolysis test. Moreover, antimicrobial susceptibility test was performed by Kirby-Bauer disk diffusion using commercially available antibiotic disks (Hi-media) on Mueller-Hinton agar. The result of the susceptibility test was interpreted according to the Clinical and Laboratory Standards Institute Guidelines (2016).

Table 1: Biochemical characterization of *Pseudomonas stutzeri*

Biochemical test performed	Results
Gram stain	Gram Negative bacilli
Catalase test	Positive
Oxidase test	Positive
TSI Agar	A/no change
SIM	Negative
Motility	Motile
Hydrogen sulfide production	Negative
Indole	Negative
Urea hydrolysis test	Negative
Citrate utilization test	Positive
Nitrate	Reduced
Voges-proskauer test	Negative
OF test	Oxidative
Lysine decarboxylase	Negative
Arginine decarboxylase	Negative
Ornithine decarboxylase	Negative
Starch hydrolysis test	Positive
Gelatin hydrolysis test	Negative

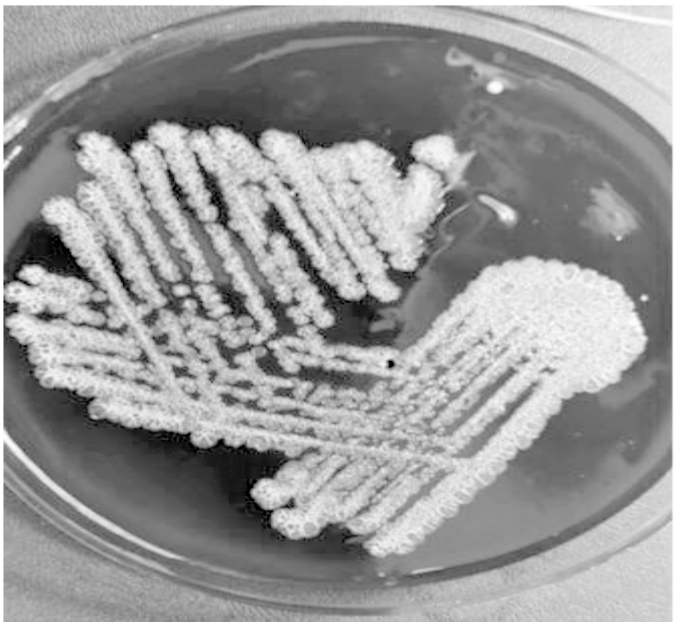

Figure 1 Colony morphology of Pseudomonas stutzeri on blood agar

DISCUSSION:

Antibiotic selection and treatment may vary depending upon isolated microorganism. *P. stutzeri* is ubiquitous gram negative bacterium that rarely causes severe infections. However, it has been isolated as an uncommon opportunistic pathogen in immunocompromised patients such as hemodialysis, meningomyelocele, Human

Immunodeficiency Virus infection and chronic obstructive pulmonary disease (8, 9). In 1956, *P. stutzeri* has been isolated from clinical and pathological materials (6, 10). Since then, many cases has been well documented; Neonatal septicemia by CSS Bello (11), Meningitis by Tasdelen, Fisgen N et al (12), Community acquired pneumonia and empyema by Mehmet Kose et al (1), peritonitis by Ceri M et al (13), endocarditis by David Grimaldi et al (14), prosthetic Vascular graft infection by Michael J et al (15) and septic arthritis by Jihad Bishara, MD (16).

Few studies have shown higher sensitivity due to reduced exposure to antibiotics because of its low incidence rate in clinical environments (17). Despite these results, we found *P. stutzeri* was resistant to different groups of antibiotics like cephalosporins and some fluoroquinolones. However, several case study have shown sensitive to different groups of antibiotic than *Pseudomonas aeruginosa.* In our study, several other antibiotics Cotrimoxazole, Imipenem and Amoxyclav were also found resistant. The evolving resistance pattern may cause treatment failure hence, antibiotic susceptibility test are prompt for better diagnosis and it must be included as pathogenic microorganism.

CONCLUSION

The infections caused by *P. stutzeri* are rare and less fatal than those caused by *P. aeruginosa* but some study have shown lethal outcomes. Most often, it represents colonization rather than infection. Beside, this few study have shown that infected patients have another serious underlying disease.

CONSENT

Written informed consent was obtained from the patients for publication of this case report and accompanying images.

COMPETING INTERESTS

The authors declare that they have no competing interests concerning the work reported in this paper.

AUTHORS' CONTRIBUTION

All authors contributed to the final version of the manuscript and approved the submission. Santosh Khanal, Govardhan Joshi and Sakrita Hona were involved in identification and diagnosis of infection, write up of the draft and final version of the manuscript.

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