

A Case of Sepsis by a Rare Pathogen *Delftia acidovorans* in a Patient Undergoing Chemotherapy

ROMYA SINGH¹, RADHIKA CHAUDHARY², CHINMOY SAHU³, SANGRAM SINGH PATEL⁴

ABSTRACT

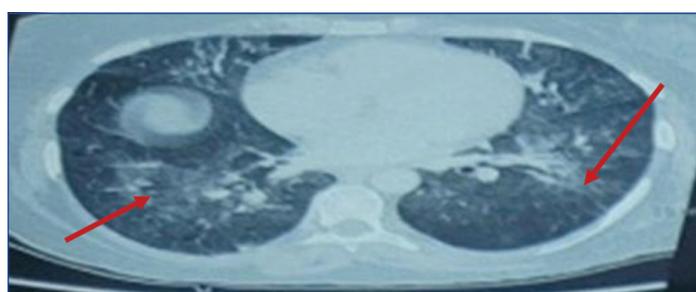
Patients undergoing chemotherapy for any malignant disease are at a higher risk of developing central line related blood stream infection, as a result of lack of proper care of the central line used for giving chemotherapy. Here, a case of sepsis by an unusual pathogen *Delftia acidovorans* is shown in a 29-year-old female patient undergoing chemotherapy for breast cancer with no other related co-morbidities and family history. On investigation, elevated procalcitonin showed presence of bacterial sepsis. Despite of empirical antimicrobial therapy, the patient showed features of continued sepsis. Blood specimens were taken and sent as paired sets of BACTEC blood culture bottles. This was identified as *Delftia acidovorans* which is rarely known to cause central line related blood stream infection and has a ubiquitous presence and cause infection mostly in immunocompromised patients. Empirical therapy was continued in the patient but could not be revived because of sudden episode of bradycardia. This report highlights the significance of appropriate diagnosis and treatment of such rare pathogen as a causative pathogen for sepsis. In this report, authors also emphasise the need of education of patients and healthcare providers for proper care of any chemoport inserted to avoid incidence of central line associated blood stream infection.

Keywords: Bradycardia, Gram negative bacillus, Immunocompromised, Septicaemia

CASE REPORT

A 29-year-old female with chief complaint of a lump in left breast was diagnosed with carcinoma breast (T3N0M0) in December 2021 and was admitted under Endocrine Surgery Department. The patient had no other related co-morbidity and no significant family history at the time of diagnosis. The patient started two cycles of chemotherapy (adriamycin and cyclophosphamide). The patient had a chemoport inserted under local anaesthesia for chemotherapy. After 10 days of last dose of chemotherapy, patient developed fever and was admitted with complaints of shortness of breath and fever (102°F) for 15 days.

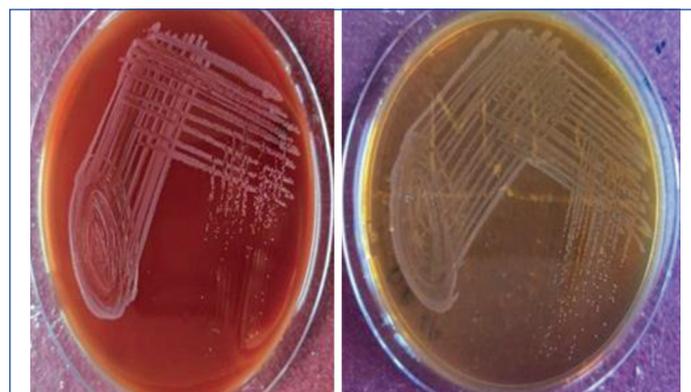
On admission, patient was having grade IV dyspnoea, bilateral coarse crepitations in chest, grade II liver enzymes dysfunction. The laboratory reports showed pancytopenia with total leukocyte count=3.4×1000/μL (Reference range=4000-10,000/μL), haemoglobin=8.1 gm/dL (Reference Ranges-Female: 12-16 g/dL), platelet count=41×1000/cmm (Reference ranges-1,50,000-4,00,000/cmm) and increased procalcitonin 7.16 ng/mL (>0.5 ng/mL: presence of bacterial sepsis), further chemotherapy was deferred. She started experiencing breathlessness (orthopnea) and was shifted to Intensive Care Unit (ICU). Computed Tomography (CT) of thorax was done showing infective changes in bilateral lung lobe suggestive of pneumonia [Table/Fig-1]. Empirical therapy for sepsis was started and comprised of combination therapy with meropenem, amphotericin B and teicoplanin. Despite of empirical antimicrobial therapy, the patient displayed features of continued sepsis. Specimens of blood were taken from peripheral and central lines at the initial presentation of sepsis and sent as paired sets of BACTEC blood culture bottles.



[Table/Fig-1]: CT chest lung window (red arrow) showing infective changes.

The incubated aerobic blood culture bottle of the two sets flagged as positive after 24 hours and gram staining showed the presence of gram negative bacilli. Further subculture was done on blood agar and MacConkey agar and plates were incubated overnight at 37°C shown in [Table/Fig-2]. The colonies on MacConkey agar were non lactose fermenter. On biochemical testing, the organism was oxidase reaction positive, non fermenter on triple sugar iron and non producer of urease. These colonies were identified as *Delftia acidovorans*, by automated system MALDI-TOF MS (matrix-assisted laser desorption/ionisation time-of-flight mass spectrometry) (99% probability) (matrix assisted laser desorption ionisation time-of-flight mass spectrometry [Biomerieux, USA]).

The patient was diagnosed to have catheter related blood stream infection with *Delftia acidovorans*. Antimicrobial susceptibility testing was done using disc diffusion method and for colistin, E test was performed. The organism was susceptible to most of the antibiotics including ceftazidime, piperacillin-tazobactam, meropenem, levofloxacin and aztreonam but resistant to amikacin and colistin, shown in [Table/Fig-3]. Patient was continued on meropenem. On day fourth, the patient was intubated in view of poor respiratory efforts and tachycardia for which noradrenaline support was given but later patient had a sudden episode of bradycardia and could not be revived and declared dead.



[Table/Fig-2]: Blood agar and MacConkey agar plates showing growth of *Delftia acidovorans*.

Antibiotics	Susceptibility
Amikacin 30 µg	R
Aztreonam 30 µg	S
Ceftazidime 30 µg	S
Ciprofloxacin 5 µg	S
Meropenem 30 µg	S
Levofloxacin 5 µg	S
Piperacillin/tazobactam 100/10 µg	S
Colistin (E-strip)	R

[Table/Fig-3]: Antimicrobial susceptibility of the isolate.
*S: Sensitive; R: Resistant

DISCUSSION

Delftia acidovorans classified in the pseudomonas ribosomal Ribonucleic Acid (rRNA) homology group III was formerly known as *Comamonas acidovorans* and was renamed in 1999 [1]. *Delftia acidovorans* is strictly aerobic, non fastidious, non fermenting, gram negative bacillus [2]. This bacterium is commonly found in water supplies and plant life. It is an environmental pathogen and is considered non pathogenic to humans in normal conditions [1,3]. Although, there are several reports documenting infection in hospitalised or immunocompromised patients [3,4], it is also reported to cause infection in few immunocompetent patients [5-7]. The present case described a line related sepsis in a patient with malignant disease undergoing chemotherapy with this rare pathogen *D. acidovorans*. In this case, the patient was a housewife and it was speculated that household water contamination of chemoport through bathing or inadvertent contamination resulted in sepsis.

Delftia acidovorans is a ubiquitous non fermentative, saprophyte, gram negative, aerobic rod that is usually not pathogenic and mainly found in soil and water. It is reported to cause infective endocarditis, Urinary Tract Infections (UTIs), empyema, otitis media, keratitis, peritonitis, UTIs and hospital acquired bacteremia, mostly catheter-related bacteremia in immunocompromised patient [8]. This report describes the sepsis in an immunocompromised patient, diagnosed as catheter-related blood stream infection.

There have been cases reported earlier of catheter-associated *Delftia acidovorans* bacteremia in immunocompromised patients. The first case of catheter-related *Delftia acidovorans* bacteremia was reported in a 27-year-old patient diagnosed with Acquired Immune Deficiency Syndrome (AIDS) and receiving ganciclovir through a central venous catheter for Cytomegalovirus retinitis [4]. Another case reported of central line related *Delftia acidovorans* bacteremia in a 65-year-old patient with natural killer cell lymphoma admitted with fever and sepsis three weeks after receiving chemotherapy [3]. In the present case report, the isolate was susceptible to ceftazidime, piperacillin-tazobactam, meropenem, aztreonam and resistant to aminoglycosides [9]. Resistance to aminoglycosides is a feature which is found consistent with *Delftia acidovorans* and this phenotypically differentiates it from *Comamonas* which is sensitive to aminoglycosides [3]. There are high chances of misidentification

of this bacteria and automated methods like MALDI-TOF MS are needed for correct identification of such rare pathogens [10].

Most of the case reports for *Delftia acidovorans* are from western countries. Earlier case reports from developed countries have reported *Delftia acidovorans* bacteremia cases in patients with haematological malignancies [3,4]. This is one of the first case reports from northern India to identify this rare pathogen as a causative agent of catheter-related blood stream infection in a immunocompromised patient. There are case reports of this pathogen from southern India. The first case reported the isolation of *Delftia acidovorans* from the endotracheal tube aspirate of a 4-year-old child [11]. The second case reported a *Delftia* related endophthalmitis in a 67-year-old male diagnosed two weeks after uneventful cataract surgery [12].

In index case, despite of meropenem therapy patient could not be saved due development of multiorgan dysfunction syndrome. The possible source of this environmental pathogen could be household water supply contamination of the chemoport. This case report raises the need to educate the patients for the proper care of any indwelling catheter, especially in an immunocompromised patient.

CONCLUSION(S)

Immunocompromised and catheterised patient with *Delftia acidovorans* bacteremia should be immediately evaluated with catheter removal and administration of broad and extended spectrum antibiotics except aminoglycosides, to avoid unfavourable patient outcome.

REFERENCES

- [1] Wen A, Fegan M, Hayward C, Chakraborty S, Sly L. Phylogenetic relationships among members of the Comamonadaceae, and description of *Delftia acidovorans* (den Dooren de Jong 1926 and Tamaoka et al. 1987) gen. nov., comb. nov. International Journal of Systematic and Evolutionary Microbiology. 1999;49(2):567-76.
- [2] Laffineur K, Janssens M, Charlier J, Avesani V, Wauters G, Delmée M, et al. Biochemical and Susceptibility Tests Useful for Identification of Nonfermenting Gram Negative Rods. Journal of Clinical Microbiology. 2002;40(3):1085-87.
- [3] Lang K, Chinzowu T, Cann K. *Delftia acidovorans* as an Unusual Causative Organism in Line-Related Sepsis. Indian Journal of Microbiology. 2011;52(1):102-03.
- [4] Lair M, Bentolilla S, Grenet D, Cahen P, Honderlick P. Oerskovia turbata and Comamonas acidovorans bacteremia in a patient with AIDS. European Journal of Clinical Microbiology & Infectious Diseases. 1996;15(5):424-26.
- [5] Khan S, Sistla S, Dhodapkar R, Parija S. Fatal *Delftia acidovorans* infection in an immunocompetent patient with empyema. Asian Pacific Journal of Tropical Biomedicine. 2012;2(11):923-24.
- [6] Chun J, Lee J, Bae J, Kim M, Lee J, Shin S, et al. *Delftia acidovorans* Isolated from the Drainage in an Immunocompetent Patient with Empyema. Tuberculosis and Respiratory Diseases. 2009;67(3):239.
- [7] Kam S, Lee W, Ou T, Teng S, Chen F. *Delftia acidovorans* Bacteremia Associated with Ascending Urinary Tract Infections Proved by Molecular Method. Journal of Experimental & Clinical Medicine. 2012;4(3):180-82.
- [8] Weinstein R. Pressure monitoring devices. Overlooked source of nosocomial infection. JAMA: The Journal of the American Medical Association. 1976;236(8):936-38.
- [9] Horowitz H, Gilroy S, Feinstein S, Gilardi G. Endocarditis associated with *Comamonas acidovorans*. Journal of Clinical Microbiology. 1990;28(1): 143-45.
- [10] Lipuma J, Currie B, Peacock S, Vandamme P, Whittier S. Manual of Clinical Microbiology. 10th ed. Washington, DC: ASM Press; 2011.
- [11] Khan S, Sistla S, Dhodapkar R, Parija S. Fatal *Delftia acidovorans* infection in an immunocompetent patient with empyema. Asian Pacific Journal of Tropical Biomedicine. 2012;2(11):923-24.
- [12] Deb A, Chavhan P, Chowdhury S, Sistla S, Sugumaran R, Panicker G, et al. Endophthalmitis due to *Delftia acidovorans*: An unusual ocular pathogen. Indian Journal of Ophthalmology. 2020;68(11):2591.

PARTICULARS OF CONTRIBUTORS:

1. Senior Resident, Department of Microbiology, SGPGIMS, Lucknow, Uttar Pradesh, India.
2. Senior Resident, Department of Microbiology, SGPGIMS, Lucknow, Uttar Pradesh, India.
3. Additional Professor, Department of Microbiology, SGPGIMS, Lucknow, Uttar Pradesh, India.
4. Associate Professor, Department of Microbiology, SGPGIMS, Lucknow, Uttar Pradesh, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Chinmoy Sahu,
Additional Professor, Department of Microbiology, SGPGIMS,
Lucknow, Uttar Pradesh, India.
E-mail: sahu.chinmoy@gmail.com

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