JIDC | THE JOURNAL OF INFECTION IN DEVELOPING COUNTRIES

Case Report

A case of infective endocarditis due to *Herbaspirillum Huttiense* in a pediatric oncology patient

Ahmet Alptuğ Güngör[1], Tugba Bedir Demirdağ[2], Bedia Dinç[3], Emine Azak[4], Arzu Yazal Erdem[5], Burçin Kurtipek[5], Aslinur Özkaya Parlakay[2], Neriman Sarı[5]

[1] *Department of Pediatrics, Ankara City Hospital, Ankara, Turkey*
[2] *Pediatric Infectious Diseases Department, Yildirim Beyazit University, Ankara City Hospital, Ankara, Turkey*
[3] *Department of Medical Microbiology, Ankara City Hospital, Ankara, Turkey*
[4] *Department of Pediatric Cardiology, Ankara City Hospital, Ankara, Turkey*
[5] *Department of Pediatric Heamatology and Oncology, Ankara City Hospital, Ankara, Turkey*

Abstract

Infective endocarditis (IE) is an infection of the endocardium and/or heart valves that involves thrombus formation (vegetation). This condition might damage the endocardial tissue and/or valves. An indwelling central venous catheter is a major risk factor for bacteremia at-risked pediatric populations such as premature infants; children with cancer and/or connective tissue disorders. *Herbaspirillum huttiense* is a Gram-negative opportunistic bacillus that may cause bacteremia and pneumonia rarely in this fragile population. Herein we report the very first case of bacteremia and IE in a pediatric oncology patient caused by *H. huttiense*.

Key words: infective endocarditis; *Herbaspirillum huttiense*; pediatric; oncology.

J Infect Dev Ctries 2020; 14(11):1349-1351. doi:10.3855/jidc.13001

(Received 09 May 2020 – Accepted 02 November 2020)

Copyright © 2020 Güngör *et al*. This is an open-access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Introduction

Herbaspirillum huttiense is a Gram-negative oxidase-positive non-fermenting bacillus commonly found in the environment, including soil, groundwater, and water distribution systems. *Herbaspirillum* species might infect human hosts by transition from these sources, mostly as opportunistic bacteria. Also, cases of human colonization and infection have mostly been noted in cystic fibrosis and immunocompromised patients such as premature newborn, cancer patients [1-8]. There are very few cases of pediatric patients in the literature including bacteremia and pneumonia. Herein we report a case of *H. huttiense* bacteraemia and Infective endocarditis (IE) in a pediatric oncology patient. To the best of our knowledge this is the very first case of IE and bacteremia caused by *H. huttiense*.

Case Report

An 11-year-old girl has been diagnosed with right distal tibia osteosarcoma and is being followed up since August 2019. She was hospitalized for having routine chemotherapy protocol. She had a fever at third day of her hospitalizing (max. 39 °C) and at the same time her other vital signs were normal. On physical examination, there was no focus of fever; she didn't have any oral mucositis or any inflammation sign on port catheter area. On complete blood count; white blood cell: 730/ mm^3 absolute neutrophil count: 430/ mm^3 and C-reactive protein: 3.35 mg/Lt (0-5 mg/Lt). Piperacillin/tazobactam (300 mg/kg/d) was started with the diagnosis of febrile neutropenia. Teicoplanine (10 mg/kg/d) was added to the first-line febrile neutropenia therapy due to resistant fever on the 3rd day. *H. huttiense* reproduced in peripheral blood and port catheter culture on the 8th day, which was sampled on the first day of fever. Antibiotic susceptibility test results are shown in Table 1. This blood culture studied on BactAlert (Biomerieux, Marcy-l'Étoile, France) device, identification of bacteria was done on VITEK MS (Biomerieux, Marcy-l'Étoile, France) device, antibiotic sensitivity was made according to EUCAST (European Committee on Antimicrobial Susceptibility Testing) criteria and tested on VITEK 2 (Biomerieux, Marcy-l'Étoile, France) device. Repeated blood cultures both from peripheral vein and port catheter were sampled. *H. huttiense* reproduced in both peripheral blood and catheter cultures, on three different days, having the same antibiotic susceptibility results.

Because of reproduced of culture sample under antibiotherapy teicoplanin and piperacillin/tazobactom, her catheter was removed on 8th day. Piperacillin/tazobactom was changed with meropenem (60 mg/kg/d) due to port catheter end culture antibiotic susceptibility test results, as fever persisted despite appropriate treatment. Echocardiography was performed due to repetitive culture positivity and resistant fever on appropriate therapy. Transthoracic echocardiogram revealed a hyper-echogenic 2×3.5 cm vegetation at inferior vena cava and right atrium junction. (Figure 1) According to recurrent culture positivity of blood cultures with the same agent on different days and vegetation on endocardium, the patient was diagnosed as IE according to Modified Duke Criteria [9]. Therefore, anticoagulant treatment (Enoxaparin Sodium 2×100u/kg/dose) added to the current treatment for vegetation. In addition, amikacin (15 mg/kg/d) was added to therapy in order to expand Gram-negative effectivity. The first sterile blood culture was seen on 48 hours after treatment changes and her fever resolved on the 5th day. Her antibiotic therapy was completed to 4 weeks. The patient's fever did not repeat during hospitalization. Her anticoagulant treatment still continues.

Discussion

Herbaspirillum huttiense is a Gram-negative bacillus that belongs to the order of *Burkholderiales*. It was described 25 years ago in isolates from plants, and also from the soil and potable water distribution systems. It is a Gram-negative bacillus, oxidase-negative, catalase-negative, non-fermentative and urease-positive, with flagella motility [1].

Figure 1. Vegetation at inferior vena cava and right atrium junction

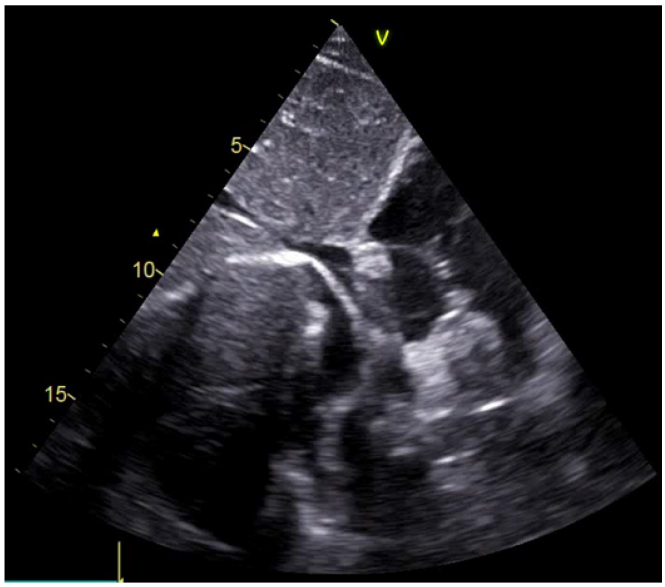

Table 1. Antimicrobial Susceptibility of *Herbaspirillum Huttiense*, studied according to EUCAST criteria.

Antibiotics	Susceptibility	MIC
Amikacin	Resistant	32
Meropenem	Susceptible	0.125
Ciprofloxacin	Resistant	6
Teicoplanin	Susceptible	0.25
Ceftazidime	Susceptible	0.50

Herein a pediatric oncology patient with the diagnosis of bacteraemia and IE due to *H. huttiense* is reported, which is to the best of our knowledge- the very first case in the literature.

H. huttiense is known as an unusual opportunistic pathogen, which is capable of causing bacteremia and sepsis in immunosuppressed patients, particularly people with cancer or undergoing hematopoietic stem cell transplantation [2-4]. Bloise *et al*. demonstrated bacteremia caused by *Herbaspirillum* species by publishing case series but phenotypic identification of herbaspirillum species was difficult in this study. According to the same study, *Herbaspirillum* species was susceptible to many antimicrobial agents. Piperacillin/tazobactam or ceftazidime was shown to be good choices for this microorganism. In our case, it was found sensitive to meropenem, teicoplanin and ceftazidime [6].

Ziga *et al*. reported a pediatric oncology patient with bacteremia due to *H. huttiense*, but there is no case of IE due to this pathogen [7]. IE is an infection of the endocardium and/or heart valves that involves thrombus formation (vegetation), which may damage the endocardial tissue and/or valves. The estimated mean incidence of infective endocarditis in children was 0.43 per 100,000 children [10]. An indwelling CVC is a major risk factor for pediatric IE [11]. At-risk pediatric populations for IE include critically ill and premature infants and children with cancer or connective tissue disorders. Rech *et al*. stated that 9 patients with pediatric malignancies were diagnosed with IE among 161 children (5.5%) [12]. Common causative agents for IE in children are streptococci and staphylococci. Gram-negative bacilli (like *Cardiobacterium*, *Eikenella* and *Kingella* species) are responsible in 8% of IE in children [10]. Among Gram-negative bacilli, *H. huttiense* is not reported as the cause of IE, to date.

In addition, catheter-related infections due to herbaspirillum species are frequently reported in the literature [8,13]. *H. huttiense* is a pathogen that should be considered especially in catheter-related Gram-negative sepsis in immunocompromised patients.

H. huttiense does not only infect immunocompromised patients. It has also been shown to infect people with healthy immune systems. Regunath *et al.* reported severe community-acquired pneumonia and bacteremia caused by *H. huttiense* or *H. aquaticum* in an immunocompetent adult [14].

In conclusion, it is important to persistently consider diagnosing IE in a repetitive culture-positive immunosuppression patient, with an indwelling central venous catheter. It should not be forgotten that IE cannot be diagnosed by only neither physical and laboratory examination nor imaging methods. Evaluating a large number of clinical signs, symptoms, laboratory test and imaging methods together can only make the diagnosis. *H. huttiense* may be seen as the responsible agent for IE in immunosuppressed patients.

References

1. Baldani JI, Baldani VLD, Seldin L, Döbereiner J (1986) Characterization of *Herbaspirillurn seropedicae* gen. nov. sp. nov. a root-associated nitrogen-fixing bacterium. Int J Sys Bacteriol 36: 86–93 .
2. Chemaly RF, Dantes R, Shah DP, Shah PK, Pascoe N, Ariza-Heredia E, Perego C, Nguyen DB, Nguyen K, Modarai F, Moulton-Meissner H, Noble-Wang J, Tarrand JJ, LiPuma JJ, Guh AY, MacCannell T, Raad I, Mulanovich V (2015) Cluster and sporadic cases of Herbaspirillum species infections in patients with cancer. Clin Infect Dis 60: 48–54.
3. Liras Hernández MG, Girón de Velasco Sada P, Falces Romero I, Romero Gómez MP (2019) Bacteremia caused by *Herbaspirillum huttiense* in a newborn. Enferm infec microbiol clin37: 491.
4. Chen J, Su Z, Liu Y, Sandoghchian S, Zheng D, Wang S, Xu H (2011) Herbaspirillum species: A potential pathogenic bacteria isolated from acute lymphoblastic leukemia patient. Curr Microbiol 62: 331–333 .
5. Spilker T, Uluer AZ, Marty FM, Yeh WW, Levison JH, Vandamme P, LiPuma JJ (2008) Recovery of Herbaspirillum species from persons with cystic fibrosis. J Clin Microbiol 46: 2774–2777.
6. Bloise I, Guedez-López GV, Tejedor-Rodríguez M, Romero-Gómez MP, García-Rodríguez J, Mingorance J, Cendejas-Bueno E (2020) Bloodstream infection due to Herbaspirillum species: Case series and review of literature. Eur J Clin Microbiol Infect Dis. In Press.
7. Ziga ED, Druley T, Burnham C-AD (2010) Herbaspirillum species bacteremia in a pediatric oncology patient. J Clin Microbiol 48: 4320–4321.
8. Suwantarat N, Adams LL, Romagnoli M, Carroll KC (2015) Fatal case of *Herbaspirillum seropedicae* bacteremia secondary to pneumonia in an end-stage renal disease patient with multiple myeloma. Diagn Microbiol Infect Dis 82: 331–333.
9. Habib G, Lancellotti P, Antunes MJ, Bongiorni MG, Casalta J-P, Del Zotti F, Dulgheru R, El Khoury G, Erba PA, Iung B, Miro JM, Mulder BJ, Plonska-Gosciniak E, Price S, Roos-Hesselink J, Snygg-Martin U, Thuny F, Tornos Mas P, Vilacosta I, Zamorano JL (2015) 2015 ESC Guidelines for the management of infective endocarditis: The task force for the management of infective endocarditis of the European Society of Cardiology (ESC) Endorsed by: European Association for Cardio-Thoracic Surgery (EACTS), the European Association of Nuclear Medicine (EANM). Eur Heart J 36: 3075–3128.
10. Gupta S, Sakhuja A, McGrath E, Asmar B (2017) Trends, microbiology, and outcomes of infective endocarditis in children during 2000-2010 in the United States. Congenit Heart Dis 12: 196–201.
11. García-Teresa MÁ, Casado-Flores J, Delgado Domínguez MÁ, Roqueta-Mas J, Cambra-Lasaosa F, Concha-Torre A, Fernández-Pérez C (2007) Infectious complications of percutaneous central venous catheterization in pediatric patients: A Spanish multicenter study. Intensive Care Med 33: 466–476.
12. Rech A, Loss JF, Machado A, Brunetto AL (2004) Infective endocarditis (IE) in children receiving treatment for cancer. Pediatr Blood Cancer 43: 159–163.
13. Rodrigues A, Maciel M, Santos C, Machado D, Sampaio J, Lima N, Carvalho MJ, Cabrita A, Martins M (2014) Peritoneal dialysis infections: An opportunity for improvement. Am J Infect Control 42: 1016–1018.
14. Regunath H, Kimball J, Smith LP, Salzer W (2015) Severe community-acquired pneumonia with bacteremia caused by Herbaspirillum aquaticum or *Herbaspirillum huttiense* in an immune-competent adult. J Clin Microbiol 53: 3086–3088.

Corresponding author

Ahmet Alptuğ Güngör
Ankara City Hospital MH4 Block, Department of Pediatrics
Üniversiteler Mahallesi 1604. Cadde No: 9 Çankaya, Ankara, 06800 Turkey
Phone: +903125526000
Fax: +903125969913
E mail: gungorahmetalptug@gmail.com

Conflict of interests: No conflict of interests is declared.