Case Report

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

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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.

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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/ mm³ absolute neutrophil count: 430/ mm³ 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].

Herein a pediatric oncology patient with the diagnosis of bacteraemia and IE due to *H. huttiense* is reported, which is to 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 a 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.

**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 |

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

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