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Case Report

Hafnia alvei Urinary Tract Infection in A Patient with Multimorbidity After Covid19 - A Case Report

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Abstract

Hafnia alvei is generally considered an opportunistic pathogen, associated mostly with nosocomial infections. There are a few case reports in literature regarding its role as an infectious agent. In this article, we describe a case of urinary tract infection in a patient with multimorbidity, a few weeks after her hospitalization for COVID-19, which was treated with ceftriaxone administration for eight days. The aim of this study is to underline the role of *H. alvei* as a potential pathogen in patients with impaired health.

Keywords: *Hafnia alvei*, Urinary Tract Infection, COVID-19, Multimorbidity.

Abbreviations: UTI: Urinary Tract Infections; EUCAST: European Committee on Antimicrobial Susceptibility Testing.

Introduction

Hafnia is a genus of Gram negative, rod-shaped, facultative anaerobic, microorganisms belonging to the Enterobacteriaceae family [1]. Until recently, *Hafnia alvei* was considered the only member of the genus, but studies based on DNA-DNA hybridizations and partial 16SrRNA gene sequencing, proved that *Hafnia alvei* is genotypically heterogeneous. Taxonomic data from further studies confirmed that *H. alvei* comprises at least two taxa at the species level, which are now classified as *H. alvei* and *H. paralvei* [2]. *Hafnia alvei* is named after the historical name of Copenhagen (Havn) and the specific epithet "alvei" is derived from the Latin word for the beehive "alveus" [3].

H. alvei is a commensal of the human gastrointestinal flora but, it has also been recovered from several natural environments (water, soil, sewage). Apart from the mammals' intestinal tract which seems to be *H. alvei 's* commonest ecologic habitat, this bacterium has been isolated from fish, insects, avian, reptiles, and invertebrates. Moreover, it has been recovered from dairy products and honey and has also been considered responsible for the deterioration of meat products [4]. There is a limited number of cases reported in literature in which *H. alvei* is shown to cause infections in humans. In this article, we present a case of *H. alvei* urinary tract infection in a patient with multimorbidity, following hospitalization for COVID-19.

Case Presentation

A 75-year-old Greek female was admitted to the Internal Medicine Clinic of the General Hospital of Amfissa due to fever and dyspnea. She had a history of diabetes mellitus type 2, hypertension, heart failure, hypothyroidism, essential tremor, hyperuricemia, and bowel polyps. Moreover, there was a strong suspicion of an underlying myelodysplastic syndrome, for which she was referred

to a hematologist. Forty-five days earlier, she was hospitalized for COVID-19 pneumonia and was discharged, after favorable clinical evaluation.

On admission, her blood pressure was as 120/80 mmHg, oxygen saturation of 94%, temperature 36,6ºC and on physical exam, diminished breath sounds, and bilateral edema of lower extremities were found. The diagnostic tests which were performed revealed: Hb 7.9gr/dL, Ht 24.8%, MCV 108.4fL, PLT 120K/μL, CRP 5.97mg/dL, D-Dimers 2.14μg/mL. Urine analysis showed protein 50mg/dL, urobilinogen 2mg/dL, red blood cells 4-6/hpf, white blood cells 100-120/hpf and abundant bacteria.

Urine culture revealed >10^5cfu/mL of a Gram (-) negative rod, on blood agar and MacConkey No2 agar. The identification and the antimicrobial susceptibility testing were performed using the Microscan Autoscan-4 System (Siemens) and the microorganism was identified as *Hafnia alvei* (Microscan ID 99,99%). The strain was found susceptible to all the antibiotics tested (ampicillin, ampicillin/sulbactam, amikacin, cefepime, cefotaxime, cefoxitin, ceftazidime, ciprofloxacin, ertapenem, fosfomycin, gentamycin, imipenem, levofloxacin, meropenem, nitrofurantoin, piperacillin, piperacillin/tazobactam, tobramycin, trimethoprim /sulfamethoxazole) according to the criteria of the European Committee on Antimicrobial Susceptibility Testing (EUCAST). The patient was started on empiric IV ciprofloxacin for two days, but due to deterioration of the inflammation markers (CRP 14,26mg/dL), she was switched to IV ceftriaxone. After eight days, the patient's symptoms subsided, and she was discharged from hospital.

Discussion

Although our knowledge on *Hafnia alvei 's* role as a human pathogen remains limited, the literature indicates that most of the infections caused by *H. alvei* occur in patients with impaired health. In earlier studies, its connection to the clinical infection is debated [5] but after 2000, there is an increasing number of case reports in which *Hafnia alvei* is involved in human infections. For example, *Hafnia alvei* is reported to cause complicated [6-9] and uncomplicated UTIs [11], bacteremia and sepsis [12-23], hemolytic uremic syndrome [24], peritonitis [25,26], chorioamnionitis and preterm birth [27], deep infection in open fractures [28], enterocolitis followed by reactive arthritis [29] and pneumonia [30-36]. Except for a urinary infection in a healthy child [11], all the other cases regard immunocompromised patients, thus underlining the role of *Hafnia alvei* as an opportunistic pathogen. Until now, there are three known cases of patients who developed *Hafnia alvei* infections in the context of COVID-19, a bloodstream coinfection with *Candida auris* and two cases of ventilator-associated pneumonia [22, 34, 35]. We present a case of a successfully treated *Hafnia alvei* UTI in a patient with multimorbidity, 45 days after hospitalization for COVID-19. COVID-19 is considered to cause immune dysbiosis and immunosuppression [34] which combined with our patient's numerous comorbidities may have allowed an opportunistic *H. alvei* infection.

Conclusion

Consequently, COVID-19 predisposes to the occurrence of opportunistic infections from unusual pathogens, such as *H. alvei*, especially in patients with immunosuppression and/or underlying diseases, thus presenting a new, overwhelming clinical challenge. Thereby, the need for surveillance of uncommon bacterial infections remains of utmost importance.

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None.

Conflict of Interest

No Conflict of Interest.

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