

CASE REPORTS

AN UNEXPECTED PATHOGEN: URINARY TRACT INFECTION CAUSED BY HAFNIA ALVEI IN A NEWBORN

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ABSTRACT

Hafnia alvei is a gram-negative bacterium that has been rarely reported as a cause of human infections. Its occurrence as an etiologic agent of urinary tract infection in the neonatal period is particularly uncommon. In this report, we present a case of a 13-day-old male neonate who was admitted with fever and irritability and was found to have *Hafnia alvei* growth in the urine culture. As the microorganism was susceptible to gentamicin, the patient was treated with gentamicin for seven days, resulting in complete resolution of clinical and laboratory findings. This case highlights that rare pathogens should be considered in the evaluation of urinary tract infections in the neonatal period and that the prognosis is favorable with appropriate antibiotic therapy.

Introduction

Hafnia is a member of the Enterobacteriaceae family and was first described in 1954. It is a motile, facultative anaerobic, Gram-negative bacillus. Until recently, it had been classified under various names, including *Enterobacter alvei*, *Enterobacter hafniae*, and as a subspecies of *Enterobacter aerogenes*. In the literature, *Hafnia alvei* has been reported as a causative agent of a wide spectrum of infections, including urinary tract infections, gastroenteritis, sepsis, meningitis, endocarditis, pneumonia, endophthalmitis, necrotizing enterocolitis, and postoperative wound infections.¹

Compared with adults, *H. alvei* is an extremely rare cause of infection in neonates. A study conducted in 1971 involving seventeen patients with *Hafnia* infections demonstrated that approximately half of these infections were transmitted via nosocomial spread related to fecal contamination of hospital environments or surfaces. In neonates, infections have also been associated with maternal carriage of *H. alvei* as part of the normal vaginal and gastrointestinal flora. Community-acquired infections have likewise been reported.^{2,3} The first neonatal *H. alvei* infection was described in 1988 in a 20-day-old preterm infant (30 weeks' gestation) presenting with sepsis and necrotizing enterocolitis. To date, two outbreaks of nosocomial *H. alvei* sepsis in neonates have also been reported.^{4,5} Here, we report a neonate who was diagnosed and treated in our unit for a community-acquired urinary tract infection caused by *H. alvei*.

Case Report

A 13-day-old male neonate was admitted to the pediatric emergency department with complaints of poor feeding

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and vomiting. He was subsequently hospitalized in the neonatal unit for further evaluation. The antenatal and perinatal history was unremarkable. Laboratory investigations obtained at admission revealed a white blood cell count of 14,200/mm³, hemoglobin level of 14.3 g/dL, and a C-reactive protein level of 0.5 mg/L (normal range: 0–5 mg/L). Urinalysis and urine culture were obtained prior to initiating antibiotic therapy.

With a clinical suspicion of neonatal sepsis, empirical treatment with ampicillin and gentamicin was started. Urinalysis showed +1 leukocyte esterase, negative nitrite, and 7 leukocytes per high-power field on microscopic examination. On the third day of antibiotic therapy, the patient's vomiting and feeding intolerance resolved. A urine culture obtained via bladder catheterization on the second day of hospitalization yielded growth of *Hafnia alvei* at a concentration of 100,000 colony-forming units/mL. Antimicrobial susceptibility testing demonstrated resistance to piperacillin-tazobactam and cephalosporins, while susceptibility to carbapenems and aminoglycosides was noted. The existing antibiotic regimen was continued accordingly.

A follow-up urine culture obtained on the fourth day of hospitalization showed no bacterial growth. Antibiotic therapy was completed for a total duration of seven days. Blood cultures obtained at admission remained sterile. Abdominal ultrasonography revealed grade 1 pelvicalyceal dilatation of the left kidney, with an anteroposterior pelvic diameter of 6.5 mm. The patient was discharged after completing treatment, with scheduled follow-up in pediatric nephrology and neonatology clinics.

Discussion

Hafnia alvei is a Gram-negative bacillus belonging to the order Enterobacterales, commonly found as part of the normal gastrointestinal flora and only rarely isolated as a human pathogen. In the neonatal period,



H. alvei infections are exceedingly rare and have most commonly been reported as sepsis, pneumonia, or gastrointestinal infections; cases of urinary tract infection (UTI) due to *H. alvei* have been described only in a limited number of case reports.^{6,7} While *Escherichia coli* and *Klebsiella* species are the most frequently identified causative agents of neonatal UTIs, recognition of rare pathogens is important for increasing clinical awareness.⁸

Most reported neonatal *H. alvei* infections have been associated with predisposing factors such as prematurity, invasive procedures, intensive care unit hospitalization, or underlying immunodeficiency.⁹ However, as demonstrated in the present case, infections may also occur in term neonates without identifiable risk factors.^{7,10} This suggests that *H. alvei*, in addition to its role as an opportunistic pathogen, may act as a primary pathogen under appropriate conditions. UTIs occurring in the early neonatal period warrant careful evaluation due to the risk of hematogenous dissemination and sepsis.⁸

Regarding antimicrobial susceptibility, *H. alvei* is generally susceptible to aminoglycosides, third-generation cephalosporins, and fluoroquinolones, although variable resistance to beta-lactam antibiotics has been reported.⁶ There are limited reports in the literature describing successful treatment of neonatal *H. alvei* infections with gentamicin.^{7,10} In the present case, the isolate was susceptible to gentamicin, and clinical recovery was achieved with a seven-day course of gentamicin monotherapy, underscoring the importance of appropriate antibiotic selection and early targeted therapy.

This case highlights the need to consider *H. alvei* among the rare etiologic agents of neonatal UTIs. Careful monitoring of response to empirical therapy

and adjustment of treatment based on culture and susceptibility results may help prevent unnecessary use of broad-spectrum antibiotics.⁸ Given the limited number of similar cases reported in the literature, the present case contributes valuable information regarding the clinical course and treatment response of *H. alvei*-associated UTIs in the neonatal period.

Compliance with Ethical Standards

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