Persistent infection with metallo-beta-lactamase and extended spectrum β-lactamase producer *Morganella morganii* in a patient with urinary tract infection after kidney transplantation

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Abstract

Organ transplant recipients under immunosuppressive therapy have a highly increased risk of acquiring unusual opportunistic infections. Diagnosis of the etiology of infection may be difficult in clinical manifestations, which need further histological and biological investigations. Here in we report, for the 1st time in the Iran, a *Morganella morganii* isolate harboring *bla*VIM, *bla*CTX-M, and *bla*SHV genes after kidney transplantation with persistent urinary infections.

Key words: Carbapenems, kidney transplant, *Morganella morganii*, opportunistic infection

INTRODUCTION

Morganella morganii is a Gram-negative facultative anaerobe that is commonly found in the environment and in the intestinal tracts of humans as normal flora and belongs to the family of *Enterobacteriaceae*. Despite its wide distribution, it has been considered a rare cause of human infections.[1] *M. morganii* is naturally resistant to tetracyclines, tigecycline, polymyxins, and nitrofurantoin.[2] Moreover, by chromosomally encoded AmpC beta-lactamases and possesses the ability to develop resistance on exposure to broad-spectrum cephalosporins.[3]

Urinary tract infection (UTI) after kidney transplantation is a common cause of patient morbidity and represents a potential risk factor for poorer graft and recipient outcome.[4] Several species of bacteria that cause UTI in kidney transplant patients have been isolated from *Enterobacteriaceae* family have been reported as the main isolates in UTI among transplant patients.[5] However, there

is an emerging evidence suggesting that *M. morganii* may become an important opportunistic pathogen in several infections but UTI is probably the most common infection caused by *M. morganii* in humans and it was first described in the late 1930s as a pathogen of urinary infections.[6,7] Patients with kidney recipient are at high risk of UTI. Here, we describe a rare case of UTI caused by *M. morganii* in a patient with a kidney transplant.

CASE REPORT

A 53-year-old male with a history of received kidney in early 2006 and after 5 years he had chronic renal failure. He had been on hemodialysis from 2010 until 2014 years and in 2014, the patient received the second kidney transplant. Before kidney transplant surgery, the initial immunosuppressive therapy was with antithymocyte globulin (ATG) and this person received ganciclovir. Due to leak of the site of graft, duration of hospitalization was extended to 24 day. His posttransplantation course was uneventful until he presented to us with the above-mentioned complaints. One month after, the placement chest radiography was normal but computed tomography of abdomen and pelvis showed in the upper left kidney stone and calcification around double-J stent (DJS). Three times attempted for removed the DJS and in the 2nd time, the patient received ATG that reduced level of red blood cell in this person. After removed the DJS, three times consecutively (7, 13, and 24 days after of removed DJS), the urine cultures revealed *M. morganii* and these isolated were susceptible to amikacin and trimethoprim – sulfamethoxazole only and resistant to cefotaxime, cefotaxime, cefazolin, ceftizoxime, gentamicin, imipenem, nitrofurantoin by disc diffusion method, but testing of susceptibility to colistin and ciprofloxacin was not done. Patient received trimethoprim-sulfamethoxazole 160 mg-800 mg (1 double-strength tablet) orally every 12 h for 14 days and was treated which a follow-up urine culture on 1 week after discontinuation of treatment was negative. Unfortunately, 28 days after discontinuation of treatment patient presented with symptoms of dysuria and urine culture after 48 h, again the isolated was *M. morganii* and isolate was resistant to trimethoprim – sulfamethoxazole, cefotaxime, cefotaxime, cefazolin, ceftizoxime, gentamicin, imipenem, nitrofurantoin, and only susceptible to ciprofloxacin and colistin that was started with a dose of ciprofloxacin 500 mg/day and was continued for 7 days and a follow-up urine culture 9 days later no growth of *M. morganii*.

A genetic analysis using enterobacterial repetitive intergenic consensus polymerase chain reaction (PCR) revealed that all four *M. morganii* isolated from urine culture were identical and *M. morganii* in this patient was stable [Figure 1] that initial treatment with trimethoprim-sulfamethoxazole was ineffective, but the patient UTI was successfully treated by ciprofloxacin. Detection of β-lactamase resistance genes (*bla*CTX-M, *bla*SHV, *bla*TEM, *bla*OXA, and *bla*CMY) and carbapenemases such as the *bla*SIM, *bla*SPM, *bla*GIM, *bla*VIM, *bla*KPC, and *bla*NDM was determined using PCR and sequencing was performed using consensus primers and amplification conditions as described[8,9] that *M. morganii* was positive for *bla*VIM, *bla*CTX-M, and *bla*SHV but was negative for other β-lactamase and carbapenemases genes.

DISCUSSION

M. morganii has recently become an important opportunistic pathogen that being frequently in immunocompromised individuals and also because of various invasive procedures.[10] Majority of *M. morganii* infections are related to postoperative wound and UTI and several study showed.

M. morganii is known to cause opportunistic infection, especially in the immune-compromised host.[11] In this case, the patients were immunocompromised due to immunosuppressive therapy that had a highly increased risk of acquiring unusual opportunistic infections. This patient had UTI with *bla*VIM and *bla*CTX-M and *bla*SHV-producing *M. morganii* that was permanent for a long time.

Carbapenemases, such VIM, are the most powerful β-lactamase, being able to hydrolyze nearly all β-lactamase.[12] VIM-producing *Enterobacteriaceae* have been isolated in several countries with high prevalence

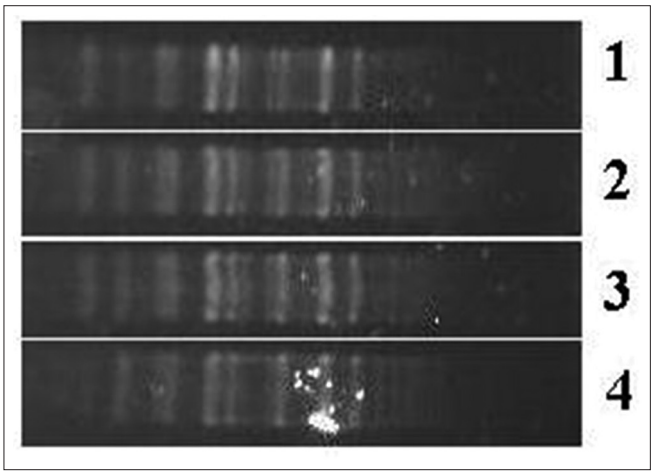

Figure 1: Enterobacterial repetitive intergenic consensus polymerase chain reaction pattern of *Morganella morganii* in four clinical isolates with 100% identity

noted in the Mediterranean and Middle East region.[13,14] Seija *et al.* in a study reported a case of blood and urine cultures grew an *M. morganii* isolate with harboring NDM-1 and qnrD1 that the patient was treated successfully with fosfomycin and double doses of meropenem.[15] In Greece, the first report chromosomal location of blaVIM-1 was confirmed after hybridization of the chromosomal band with the blaVIM-1 probe.[16] To our knowledge, this is the first clinical report of a carbapenem-resistant *M. morganii* case in immunocompromised kidney transplant in Iran. It is probable that the blaVIM carbapenemase has arisen within our hospitals where the spread of this strain and its resistance elements are of great concern for public health. Therefore, early detection, characterization, and surveillance of these resistance elements are extremely important in future for prevention and treatment.

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Conflicts of interest

There are no conflicts of interest.

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