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Case Report

Microbiology Section

Myroides Species in a Paediatric Burn Patient

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ABSTRACT

Members of the genus *Myroides* are non-motile, Gram negative bacteria that are mostly found in environmental sources such as soil and water. They are not a part of human flora. For a long time they were evaluated as low grade opportunistic pathogens causing infections in immunocompromised patients whereas a few life-threatening infections were reported in immunocompetent individuals due to *Myroides* species.

The child having a 64% of total body surface area burn was admitted to the burn unit. *Myroides* spp. was isolated first in urine culture then in blood culture. This is the first time *Myroides* spp. is reported in a paediatric patient with serious burn.

Keywords: Blood culture, Child, Flavobacterium, Urinary culture, Urinary tract infection

CASE REPORT

A five-year-old boy from Syria, suffering from severe burn injury was presented to our hospital. Child was brought from a border hospital after a bomb attack in his country. In the physical examination, the general condition was poor and he was drowsy when the patient was admitted to the hospital. The child with 64% of total body surface area burn was admitted to the burn unit of hospital. Second degree burns were present on the face and gluteal region, in both lower extremities and feet. Third degree burns were also found in the right arm and hand. The written informed consent was obtained from the parent of the child.

Laboratory tests indicated a white blood cell count of 6600/mm^3 in complete blood count having 64% neutrophils and 20% lymphocytes in peripheral blood smear, C-Reactive Protein (CRP) value of 91.7 mg/L (reference range, 0-5 mg/L). Urinalysis was performed by FUS-200 Urine Analyser (Dirui Industry, Changchun, China). The results were, pH 5.5, specific gravity 1009, trace amount of protein and ketone (++). There were no leukocytes in urine microscopy. Blood, urine and wound cultures were made several times during hospitalization process.

Blood cultures were incubated in both aerobic and anaerobic conditions for one week and then 24 hours at 37°C on sheep blood agar and Eosin Methylene Blue Agar (EMB). Urine cultures were incubated at 37°C on sheep blood agar and EMB for 24 hours. Since *Pseudomonas* spp. infections are prevalent in burn patients in our hospital, empirical treatment with ceftazidime (2X500 mg) was started at the 1st day of hospitalization. Colistin (2X75 mg) was added at 5th day of hospitalization.

Linezolid (2 mg/mL) was also added at 14th day to the therapy due to growth of *Enterococcus* spp. in blood culture. Besides this treatment, 100.000 CFU/mL Gram-negative rods were reported in urine culture during the 17th day of hospitalization. The urine sample was cultured in Eosin Methylene Blue Agar (EMB) and sheep blood agar at 37°C for 24 hours. Yellow pigmented and non-haemolytic colonies were observed at macroscopic examination and Gram-negative bacilli were seen in Gram-staining which necessitated further identification. Non-fermentative Gram-negative bacilli which were catalase, oxidase and urease positive, citrate and indole negative were analysed by VITEK_2 (bioMerieux, Nürtingen, Germany) identified as *Myroides* spp. According to antimicrobial susceptibility results which were determined by VITEK_2 compact system; the strain showed resistance to ampicillin/sulbactam ≥32 µg/mL, piperacillin ≥128 µg/mL, piperacillin/tazobactam ≥128 µg/mL, ceftazidime ≥64 µg/mL, cefoperazone/sulbactam ≥64 µg/mL, cefepime ≥64 µg/mL, amikacin ≥64 µg/mL, gentamycin ≥16 µg/mL, netilmycin ≥32 µg/mL, levofloxacin ≥8 µg/mL, tetracycline ≥16 µg/mL, tigecycline ≥8 µg/mL, colistin 16 µg/mL, trimethoprim/sulfamethoxazole ≥320 µg/mL. The isolate was sensitive both to imipenem ≥2 µg/mL and meropenem ≥4 µg/mL. Urinalysis was performed in concordance with urine culture 17th day and leukocytes were seen in urine microscopy. Laboratory tests showed a CRP level of 230.8 mg/dL and 78% neutrophils in peripheral blood smear. *Myroides* spp. was determined as a cause of infection where on >100.000 CFU/mL grew in the recurrent urine cultures. According to the results of antibiotic susceptibility tests imipenem (3X500 mg/IV) was started. There was no bacteria in the following control urine cultures, serum CRP level was found to be 127.6 mg/L and no leukocytes seen in urine sample at that time. Imipenem therapy was stopped at 39th day. On the other hand blood culture samples taken from both arms of the patient were evaluated by BacT/ALERT® 3D Microbial Detection System (bioMerieux, France). The instrument reported positive results and in blood culture at 47th day and *Myroides* spp. were isolated. We confirmed our results via VITEK_2 system. Since the *Myroides* strain which was isolated in urine culture at 17th day was found as sensitive to imipenem then we initiated imipenem (3X500 mg/IV) therapy again. According to the first antibiotic susceptibility tests *Myroides* spp. was found sensitive to meropenem, intermediately resistant to imipenem and piperacillin/tazobactam and resistant to other antibiotics. We could not change the treatment because the patient was exitus and blood culture and susceptibility tests could not be performed again.

DISCUSSION

The genus *Myroides* which have been previously classified as *Flavobacterium odoratum* comprises two species *M. odoratus* and *M. odoratimimus*. Bacteria in the genus *Myroides* are aerobic, yellow-pigmented, non-motile Gram-negative bacteria and produce characteristic fruity odor. They are commonly found in wet environments such as soil and water. Although *Myroides* spp.

are usually considered to be non-pathogenic, they are isolated in immunocompromised patients [1,2,3,5]. Up to now, several cases of *Myroides* spp. were reported due to urinary tract infections [3,4], bacteremia [1,5,2], soft tissue and bone infections [6], sepsis [1], meningitis [7], pneumonia [7,8] in the literature. A few cases were reported in immunocompetent hosts [1,6,9]. So far three nosocomial outbreaks of *Myroides* spp. were reported [3,4]. This is the first time *Myroides* spp. is reported in a pediatric patient with severe burn.

Burn injury leads to both loss of skin function and immunological damage which provokes inflammatory processes. The severity of the burn which is expressed as total body surface area in percentage and long duration of hospital stay are the most prominent risk factors for burn infection. Loss of skin barrier and disruption of vascularization due to wound enable microbial colonization [10]. Patients having more than 40% total body surface area burns need utmost care and it is reported that almost 75% of all burn related deaths are associated with infectious complications [11].

Myroides spp. is a low grade opportunistic pathogen which leads to severe diseases both in immunocompromised and immunocompetent patients [1,6,7,9]. Because of multidrug resistance nature of *Myroides* spp. early identification and performance of the antibiotic susceptibility tests are very important issues. Mammeri et al. reported that they were resistant to beta-lactamase due to the production of chromosomally encoded metallo beta-lactamase (TUS-1 and MUS-1) [12]. In the studies many strains were found to be resistant to beta-lactamase, monobactam and carbapenems and exhibit variable susceptibility to aminoglycosides, quinolones and trimethoprim/sulfamethoxazole [1,3,6]. In our case *Myroides* strain which was isolated from urine culture was sensitive only to imipenem and meropenem. On the other hand 30 days after first positive result of urine culture, *Myroides* spp. was isolated in blood culture and it was sensitive to meropenem, intermediate resistant to imipenem and piperacillin-tazobactam.

Ktari et al., reported a nosocomial outbreak of urinary tract infection caused by *Myroides odoratimimus* in a Tunisian hospital. In their study all patients were recieving one to four different antibotics (cefotaxime, imipenem, colistin, ofloxacin) at the time of isolation for a mean duration of 20.8 days (range: 12-42). They indicated that use of carbapenems predominantly for multidrug resistant *Acinetobacter baumannii* and *Pseudomonas aeruginosa* infections might cause selection of pan-resistant *Myroides* spp. in their setting [3]. Another study drew attention to some factors such as open wounds and prior exposure to broad-spectrum antibiotics which alter the normal gut and skin may be the underlying cause of severe invasive infections in *Myroides* spp. [13]. In accordance with the studies we isolated *Myroides* spp. at the 17th day of hospitalization while our patient was recieving empirical treatment colistin and ceftazidime therapy and our patient suffered from 64% of total body surface area burn.

It is known that some conditions may form a basis of this agent such as diabetes mellitus, malnutrition, chronic obstructive pulmonary disease injury, surgery, trauma [1,6]. Two nosocomial outbreaks occured in patients with urinary stones or urinary neoplasms undergoing endourologic operations with long hospital stay. Environmental water in hospital is thought to be responsible but the exact source of nosocomial *Myroides* spp. cannot be determined [3,4]. In our case nosocomial transmission cannot be theoretically excluded since the organism was isolated first time in a patient admitted into the burn unit of our hospital. We did not detect any cases of *Myroides* spp. afterwards. We propose that this patient had colonization of *Myroides* spp. before admission to hospital due to poor living conditions.

CONCLUSION

To our knowledge, this is the first case *Myroides* spp. which is reported in a paediatric burn patient. Bacteria of the genus *Myroides* are rare opportunistic pathogens and highly resistant to most of the antibiotics. Because of the limited clinical experience we have difficulties to lead antibiotic therapy correctly. In conclusion clinicians should be aware of *Myroides* spp. which might be an etiologic agent especially in patients living in poor conditions.

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