**INTRODUCTION**

Two species comprise the genus Oligella, named as such because of the small size of the bacilli on Gram stain (Gr. adj. oligos, little; scanty; M.L. dim. ending -ella; M.L. fem. n. Oligella, referring to small bacterium with limited nutritional properties). They comprise *Oligella ureolytica*, previously known as Centers for Disease Control and Prevention (CDC) group IVe Gram-negative, and *Oligella urethralis*, which was formerly classified as *Moraxella urethralis* or CDC group M-4. They are non-capsulated, non-spore-forming small rods, mostly not exceeding 1 micron and often occurring in pairs [1, 2]. Mostly non-motile, but some strains of *O. ureolytica* are peritrichously flagellated; strictly for these strains, the rapidity of the urease reaction (within minutes after inoculation) is a distinctive feature [1].

It has been reported that *O. ureolytica* is susceptible to aminoglycosides and cephalosporins but resistant to usual serum concentrations of ampicillin, chloramphenicol, erythromycin, penicillin G, tetracycline and trimethoprim-sulfamethoxazole (TMP-SMX) [3, 4]. *O. urethralis* differs in that it is generally susceptible to most antibiotics including penicillin, even if a quinolone resistance has been reported in *Oligella urethralis*-associated chronic ambulatory peritoneal dialysis peritonitis [5]. In this article, we report a case of *O. ureolytica* bloodstream infection in a man with aortic valvular bio-prosthesis and review the literature for previously reported cases of Oligella infections.

**SUMMARY**

*Oligella ureolytica* is an emerging bacteria rarely implicated as a human pathogen. It is mostly recovered from urinary and respiratory tract specimens as a commensal organism, but very seldom from bloodstream infections. It is rarely reported in the literature, probably due to misidentification of the organism or uncertainty of its pathogenicity.

**Keywords:** *Oligella ureolytica*, *Oligella urethralis*, bloodstream infections, urinary tract infections.

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**CASE REPORT**

The patient, a 66 year-old-male who recently underwent to heart surgical intervention of aortic valve substitution with bio-prosthesis (Carpentier-Edwars Perimount Magna Ease n. 27) due to severe aortic stenosis, in June 2015 was admitted to the emergency room of our hospital with the chief complaints of fever, dizziness, weight loss of 3 kg on the last month, and a singular episode of biliary vomiting and diarrhoeic stools many days before. His past medical history included...
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systemic hypertension, non-critical carotid atherosclerosis, dyslipidaemia, fatty liver, history of smoking and alcohol abuse (maybe still active), chronic gastritis, groin hernia surgical intervention, L4-L5 and L5-S1 herniated discs, scoliosis. To note, he was on urological ambulatory follow up for asymptomatic prostatic hypertrophy and external urethral meatus sub stenosis (lichen planus).

The medical examination on emergency room revealed that the general condition was essentially normal except for increasing fever (T 38.9 °C) with chills and pale skin, without any cardiac, respiratory, abdominal or neurological signs or symptoms. On haematological investigation notably white blood cells (WBC) 15.88x10^3/μL, red blood cells 3.91x10^6/μL, haemoglobin 14.1 g/dL, platelets 78 x10^3/μL, neutrophils 87.0%, lymphocytes 9.7%, monocytes 2.6%, eosinophils 0.1%, international normalized ratio (INR) 1.02, glucose 129 mg/dL, urea 58 mg/dL, creatinine 2.07 mg/dL, total bilirubin 2.54 mg/dL, direct bilirubin 1.31 mg/dL, serum glutamic oxaloacetic transaminase (GOT) 72 U/L, serum glutamic pyruvic transaminase (GPT) 47 UI/L, sodium 131 mEq/L, potassium 3.5 mEq/L, C-reactive protein (C-RP) 80.0 mg/L. Urine stick and chest X-ray were normal, electrocardiogram 96 rate p.m., sinus rhythm and right bundle branch block (no differences with previous control).

A fourfold blood cultures sample and urine sample were drawn and sent for culture due to the rising WBC count, C-RP value and high grade fever in patient with aortic valve bio-prosthesis. Blood culture was performed in Bact ALERT 3D (bioMérieux, INC) using a sample volume closer to the recommended 10 mL for each culture bottle (aerobic and anaerobic culture bottle). Subcultures were performed in MacConkey agar, Columbia ANC agar + 5% sheep blood, and Chocolate agar + PolyViteX (bioMérieux, SA, France). After 48 hrs of incubation, non-lactose fermenting colonies in pure culture grew on Chocolate agar + PolyViteX. On blood agar, the colonies were opaque and non-hemolytic. The organisms were small, aerobic, oxidase and catalase positive Gram-negative coccobacilli.

Identification of the isolate as *O. ureolytica* was confirmed by Vitek2 (bioMérieux, INC) with Gram negative GN REF21341 identification (GNID) card with 97% probability. By API 32GN (bioMérieux, SA, France) the isolate was identified as *Oligella* spp with 88% probability.

By Kirby-Bauer disc diffusion method and following the CLSI guidelines, the organism was resistant to ampicillin, ceftriaxone and was susceptible to amoxicillin/clavulanic acid, piperacillin/tazobactam, levofloxacin and imipenem. Before microbiological result being available, rising the clinical suspicion of infective endocarditis (I.E.), the patient was empirically started on parenteral vancomycin (2 g/die, with a loading dose of 1 g, in continuous infusion) and gentamicin (3 mg/kg/die), and oral rifampin (600 mg/die).

One day after hospital admission a trans-thoracic echocardiography (T.T.E.) was performed, not revealing any signs of I.E. Also the urine sample was sterile. Therefore, taking into account the rising values of bilirubin and inflammatory markers, thinking about a possible biliary tract infection origin (cholangitis like even without specific abdominal symptoms or jaundice), the antibiotic therapy was changed into piperacillin/tazobactam (4.5 g IV every 8 hours, calculated creatinine clearance of 80 mL/min, based on Cockroft and Gault formula). All the haematological tests and clinical conditions began to ameliorate very quickly, and the above mentioned antibiotic therapy was continued after confirmation of *Oligella ureolytica* on blood cultures, until C-RP and procalcitonin negativity (14 days of treatment).

Blood and urine cultures performed many days after antibiotic treatment interruption were all negative. As many cases of malignant tumours associated with *Oligella* spp. infection have been previously reported in literature, we performed abdominal ultrasound and computed tomography scan, and also colonoscopy (4). All of them were negative for solid tumours, and revealed only bilateral simple kidney’s cysts and few intestinal polyps (histological examination: tubular adenoma with low grade dysplasia).

**DISCUSSION**

*Oligella* spp. infection has rarely been reported in the literature. This may be due to misidentification of the organism, because of inadequate processing of non-fermenting oxidase positive Gram negative bacilli, or uncertainty of its pathogenic-
Oligella ureolytica. Case reports published since 1978 on PubMed and their clinical features are reported in Table 1. Oligella ureolytica is mostly recovered from the urinary tract and respiratory tract specimen as a commensal organism, it is commonly isolated from urine of patients with indwelling urinary catheters, but very seldom from bloodstream infections [6].

In this article, we report a case of O. ureolytica related bacteraemia in a man recently undergone to heart surgical intervention of aortic valve substitution with bio-prosthesis. In the previous reports, most patients were adults with underlying diseases (as far by now only one case in new-born), especially an immunosuppressive condition (four with solid tumours, one with lymphoma, and one with acquired immune-deficiency syndrome) in contrast to our case [4, 7, 8]. Urinary tract obstruction is a predisposing factor for bacteraemia. In our case, the patient was on urological follow up due to asymptomatic prostatic hypertrophy and external urethral meatus sub stenosis without obstruction symptoms. However as urine culture was sterile and no clinical or laboratory evidence to suggest any abnormality of the urinary tract was present, the mechanism of infection remains unclear.

As evidenced in the previous studies, infections due to Oligella appear to respond quickly to antibiotics, but additional therapy may be required for complete resolution when there’s an urinary tract obstruction as a predisposing condition [9]. O. ureolytica strains are generally resistant to ampicillin, chloramphenicol, erythromycin, penicillin G, tetracycline and TMP-SMX, but susceptible to aminoglycosides, cephalosporins and carbapenems [3]. O. ureolytica strains highly resistant to cephalosporins, carbapenems and ciprofloxacin were also reported. In this study, our strain was resistant to ampicillin and 3rd generation cephalosporins, and intermediately resistant to erythromycin; but, at the same time, it maintained sensitivity to amoxicillin/clavulanic acid, piperacillin/tazobactam, levofloxacin and carbapenems. TMP-SMX was not tested, taking into consideration the study conducted by Welch et al. who tested 96 isolates of group IVe (O. ureolytica) bacteria and found that most were resistant to usual serum concentrations of TMP-SMX [3]. Indeed, in vitro susceptibility testing may yield conflicting results; for instance, in the case reported by Manian in 1993, the patient developed bacteraemia while receiving both ciprofloxacin and TMP-SMX, antibiotics to which the organism was susceptible in vitro [8].

In this study microbial identification was performed by an automated identification system and biochemical tests. It is clear that the major limitation was the lack of molecular based confirmation of the strain.

<table>
<thead>
<tr>
<th>Year</th>
<th>Age</th>
<th>Isolate</th>
<th>Source</th>
<th>Underlying conditions</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>1978</td>
<td>5</td>
<td>O. ureolytica</td>
<td>Blood, urine</td>
<td>Uterine adenocarcinoma, obstructive uropathy</td>
<td>Recovered</td>
</tr>
<tr>
<td>1992</td>
<td>83</td>
<td>O. urethralis</td>
<td>Knee fluid</td>
<td>Rectal adenocarcinoma, septic arthritis</td>
<td>Recovered</td>
</tr>
<tr>
<td>1993</td>
<td>75</td>
<td>O. urethralis</td>
<td>Blood, urine</td>
<td>Metastatic colorectal carcinoma, obstructive uropathy</td>
<td>Recovered</td>
</tr>
<tr>
<td>1993</td>
<td>40</td>
<td>O. ureolytica</td>
<td>Blood</td>
<td>AIDS, sacral ulcer, fungaemia</td>
<td>Responded, died secondary to fungemia</td>
</tr>
<tr>
<td>1996</td>
<td>45</td>
<td>O. ureolytica</td>
<td>Lymph node</td>
<td>Non-Hodgkins lymphoma</td>
<td>Recovered</td>
</tr>
<tr>
<td>2001</td>
<td>70</td>
<td>O. urethralis</td>
<td>Urine</td>
<td>Bladder operation, hysterectomy, chronic pyelonephritis</td>
<td>Recovered</td>
</tr>
<tr>
<td>2001</td>
<td>18 months</td>
<td>O. ureolytica</td>
<td>Blood</td>
<td>Pneumonia</td>
<td>Recovered</td>
</tr>
<tr>
<td>2012</td>
<td>Newborn</td>
<td>O. ureolytica</td>
<td>Blood</td>
<td>Sepsis</td>
<td>Recovered</td>
</tr>
<tr>
<td>2014</td>
<td>30</td>
<td>O. ureolytica</td>
<td>Blood</td>
<td>Lung adenocarcinoma (moderately differentiated) with multiple abdominal lymph node metastasis</td>
<td>Recovered</td>
</tr>
<tr>
<td>Present study</td>
<td>66</td>
<td>O. ureolytica</td>
<td>Blood</td>
<td>Sepsis, asymptomatic prostatic hypertrophy, external urethral meatus sub stenosis</td>
<td>Recovered</td>
</tr>
</tbody>
</table>
To the best of our knowledge, this is the first case of *Oligella ureolytica* infection reported from Italy.

**CONCLUSIONS**

This case emphasized the potential role of *Oligella ureolytica* as an infectious agent related with bacteremia, and highlights the importance of microbiological vigilance which is required to identify this unusual agent of the disease, even in patients without any specific underlying disease (like immunosuppression) or predisposing factors (like urinary tract obstruction). Early suspicion, diagnosis and prompt treatment with targeted antibiotics are needed to prevent further complications.

**Conflict of interests:** No conflict of interests is declared.

The paper is original, is not being considered for publication by any other journal, and has not been published elsewhere in the same or similar form.

**REFERENCES**


