Use of 16S rRNA gene-based sequencing for identification of *Oligella urethralis* that was misidentified as *Franciscella tularensis* by an automated system

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**Introduction:** *Oligella* infections are rare and have been only rarely reported in the literature. This may be due to the misidentification of *Oligella* as a *Moraxella*-like organism. To the best of our knowledge, we present what we believe to be the first case report on *Oligella urethralis* bacteraemia in India.

**Case presentation:** A 65-year-old female patient with compromising underlying illness presented with signs and symptoms of bacteraemia. The organism was initially identified as *Franciscella tularensis* by a bioMérieux colorimetric VITEK 2 Compact GN ID card, but 16S rRNA gene sequencing confirmed the isolate as *O. urethralis*.

**Conclusion:** The case emphasizes the importance of *O. urethralis* as an emerging opportunistic pathogen. Although automated systems allow accurate and rapid identification of commonly isolated bacterial organisms, they are less likely to correctly identify slow-growing, fastidious, rare or biochemically inert organisms. Therefore, it is good to confirm such isolates with a second method such as 16S sequencing and/or matrix-assisted laser desorption/ionization time-of-flight MS.

**Keywords:** 16S rRNA gene sequence; bacteraemia; *Franciscella tularensis*; imipenem; piperacillin/tazobactum; *Oligella urethralis*; VITEK 2 Compact.

**Introduction**

The genus *Oligella*, so named due to the small size of the bacilli on Gram staining, comprises two species: *Oligella ureolytica* and *Oligella urethralis*. *O. urethralis*, formerly *Moraxella urethralis* and Centers for Disease Control group M4, belongs to a group of taxonomically diverse non-fermentative Gram-negative bacilli (Rossau *et al.*, 1987; Winn *et al.*, 2006). These organisms are commensals of the genitourinary tract, and most clinical isolates are from urethral samples and are often associated with an indwelling Foley catheter. Rare causes of bacteraemia, septic arthritis and pyelonephritis have been reported in the literature (Mesnard *et al.*, 1992).

Automated systems are used in the majority of clinical microbiology laboratories and are heavily relied on to promptly identify organisms. These systems provide rapid identification, thus reducing turnaround times and improving efficiency and cost-effectiveness (Snyder *et al.*, 2008). However, they are less likely to correctly identify clinically relevant non-fermenting Gram-negative bacilli.

We report a case of *O. urethralis* bacteraemia that was misidentified by a VITEK 2 compact system as *Franciscella tularensis*.

**Case report**

A 65-year-old female patient who lived in a rural area of Bangalore presented to the Emergency Medical Department of our hospital with predominant complaints of breathlessness for 1 day, swelling of both lower limbs and cough with expectoration for 3 days duration. The patient was a known case of diabetes mellitus, had hypertension for the past 15 years and had ischaemic heart disease 1 year previous; stage 4 chronic kidney disease was diagnosed. She was on regular treatment. On the same day of hospital admission she was shifted to the Intensive Care Unit and intubated in view of tachypnea, reduced pO₂ on arterial blood gas analysis and acidosis.

At the time of admission her pulse rate was 80 min⁻¹, respiratory rate 40 min⁻¹ and blood pressure 180/90 mmHg. On chest examination, bilateral rhonchi and lower zone fine crepts were present. Abdominal examination revealed distension with free fluid. Bilateral lower limb swelling
with pitting pedal oedema was seen. An ulcer was noted on
the plantar aspect of the left foot extending up the lateral
aspect. No significant lymphadenopathy was noted.

Investigations revealed a white blood cell count of 20 000 µl−1
with 90 % polymorphonuclear cells, haemoglobin 8.9 g dl−1,
platelets 276 000 µl−1, general random blood sugar 335 mg
dl−1 and HbA1C 10.5 %. Electrolyte imbalance was noted
with increased serum potassium (7.7 mEq l−1), with low
sodium (130 mEq l−1) and calcium (8.4 mg dl−1). The
patient was found to have raised renal parameters (serum
creatinine 5.29 mg dl−1, blood urea 143.1 mg dl−1) and
was intubated, sputum sample could not be obtained.

The patient was treated empirically with injectable piperacillin/tazobactum 2.25 mg every 8 h and injectable imipenem 250 mg every 12 h for 6 days. From the blood
cultures, a single bacterial species was isolated and identi-
ified as F. tularensis. Only partial sequencing was per-
formed, submitted to GenBank and given GenBank accession
number KF280285.1.

Although the patient had expired, an antibiotic sensitivity
test was still performed on this O. urethralis isolate for
research purposes. As there are no validated testing
methods and based on little documentation available in
the literature, an antibiogram was performed by the
Kirby Bauer disc diffusion method (Alireza et al., 2006).
The isolate was found to be sensitive to imipenem, mer-
openem, piperacillin/tazobactum, tobramycin, ceftazidime
and amikacin, and resistant to penicillin, ampicillin and
cotrimoxazole.

**Discussion**

A review of previously published case reports yielded only
five cases of *Oligella* bacteraemia; four cases caused by*Oli-
gella ureolytica* and only one case reported of *Oligella ure-
thalis* bacteraemia (Baqi & Mazzulli, 1996; Baruah et al.,
2014). The clinical significance of *Oligella urethralis* bacte-
raemia is unknown and the mechanism of infection remains
unclear, but it appears to occur in conjunction with com-
promising underlying illness, as seen in the cases reported
so far. Available literature also suggests that *Oligella* infec-

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**Table 1. O. urethralis identification by conventional phenotypic methods**

<table>
<thead>
<tr>
<th>Conventional ID</th>
<th>No. of isolates</th>
<th>16S rRNA gene sequence ID</th>
<th>GenBank accession no.</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comamonas spp.</td>
<td>1</td>
<td>O. urethralis</td>
<td>KC866170</td>
<td>de Melo Oliveira et al. (2013)</td>
</tr>
<tr>
<td>O. urethralis</td>
<td>2</td>
<td>O. urethralis</td>
<td>KC866214, KC866215</td>
<td>de Melo Oliveira et al. (2013)</td>
</tr>
<tr>
<td>F. tularensis</td>
<td>2</td>
<td>O. urethralis</td>
<td>–</td>
<td>Bosshard et al. (2006)</td>
</tr>
<tr>
<td>No identification</td>
<td>2</td>
<td>O. urethralis</td>
<td>–</td>
<td>Zhinder et al. (2007)</td>
</tr>
<tr>
<td>No identification</td>
<td>1</td>
<td>O. urethralis</td>
<td>AF133538</td>
<td>Drancourt et al. (2000)</td>
</tr>
<tr>
<td>F. tularensis</td>
<td>1</td>
<td>O. urethralis</td>
<td>KF280285.1</td>
<td>Present study</td>
</tr>
</tbody>
</table>
In conclusion, molecular methods should be considered to correctly identify such rare organisms and this will likely impact patient care in addition to microbiologic research. Hence, strict microbiological vigilance is required in the identification of these clinically relevant non-fermenting Gram-negative bacilli.

References


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References


