The Brief Case: Extragenitourinary Location of *Oligella urethralis*

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CASE

A 51-year-old man was referred to the emergency department because of dyspnea and reduced oxygen saturation. He had a history of chronic alcohol abuse, cigarette smoking, and stage II chronic obstructive pulmonary disease. Ten months before, a locally advanced but stable non-small-cell lung cancer of the lower-left lobe was diagnosed. On admission, the patient presented with respiratory distress associated with dyspnea at rest, difficulty speaking, noisy breathing, and chest retractions. He presented with signs of altered mental status, hypercapnia with profuse sweating, and tachycardia, which rapidly worsened (Glasgow coma scale 14 to 3). Auscultation was asymmetric, with decreased breath sounds at the left base. Laboratory investigations on admission revealed respiratory acidosis (pH 7.13 [reference range, 7.35 to 7.45]; partial pressure of carbon dioxide [PaCO₂], 94.8 mm Hg [reference range, 35 to 48 mm Hg], partial pressure of O₂ [PaO₂], 67 mm Hg [reference range, 83 to 108 mm Hg], and oxygen saturation [SaO₂], 82% [reference range, 94% to 98%]), leukocyte count of 24.9 cells/ μ l (reference range, 4 to 10 cells/ μ l) with 88.5% neutrophils, platelet count of 575 cells/ μ l (reference range, 150 to 400 cells/ μ l), hemoglobin concentration of 11.9 g/dl (reference range, 12 to 16 g/dl), and serum C-reactive protein level of 270 mg/liter (reference range, <5 mg/liter). A pulmonary abscess was revealed on chest computed tomography (CT), with the entire lower-left lobe consolidated and pulmonary artery involvement due to the neoplastic process (Fig. 1).

Empiric intravenous treatment was started with cefotaxime, rovamycin, methylprednisolone, and inhaled bronchodilation agents. The patient was intubated in the evening and developed an atrial flutter, followed by cardiopulmonary arrest for 10 min. He was transferred to the intensive care unit (ICU), where the following samples for microbiological testing were taken: protected bronchial sampling, blood cultures, and a *Legionella* urinary antigen test. A few hours after ICU admission, he underwent massive hemoptysis, hypovolemic shock, and cardiopulmonary arrest. He died 12 h after ICU admission, 5 days after emergency admission.

Microbiology analysis of the protected bronchial sample revealed numerous neutrophils and bronchial cells and a few Gram-negative coccobacilli. After 48 h of incubation at 37°C, no colonies were observed on Columbia agar plates incubated anaerobically, but small nonhemolytic nonpigmented odorless colonies were detected at a density of 10⁵ CFU/ml in pure culture on Columbia agar with 5% horse blood (Oxoid, Thermo Scientific, Hampshire, United Kingdom) and on chocolate agar with PolyVitek (Oxoid, Thermo Scientific) incubated at 37°C under a 5% CO₂-enriched atmosphere (Fig. 2). Matrix-assisted laser desorption ionization–time-of-flight mass spectrometry (MALDI-TOF MS) (MTB_lib_v6 database, MALDI Biotyper software; Bruker

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For answers to the self-assessment questions and take-home points, see <https://doi.org/10.1128/JCM.01543-18> in this issue.

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FIG 1 Chest CT picture. The consolidation of the entire left lobe was revealed, corresponding to an *Oligella urethralis* pulmonary abscess (arrow).

Daltonics, Bremen, Germany) identified the strain as *Oligella urethralis* (log score, 2.49). Complete 16S rRNA gene sequencing of the isolate confirmed the identification (query cover, 100%; identity, 100%; strain Brest, GenBank accession number [MH285271](#)). Antibiotic susceptibility testing was determined by a broth dilution susceptibility test. Because validated antimicrobial breakpoint values have not yet been established for this genus, the strain was investigated for antimicrobial susceptibilities using interpretation based on pharmacokinetic-pharmacodynamic (PK-PD) breakpoints according to the EUCAST recommendation (1). The strain was found to be susceptible to all β -lactams tested (penicillin [MIC, 0.125 mg/liter], amoxicillin [MIC, 0.5 mg/liter], and cefotaxime [MIC, 0.19 mg/liter], and β -lactamase-negative on nitrocefin test), and to aminoglycosides (gentamicin MIC, 0.25 mg/liter), trimethoprim-sulfamethoxazole, and imipenem on disk diffusion, but resistant to fluoroquinolones (ciprofloxacin MIC, >32 mg/liter). Other bacterial samples (blood cultures and *Legionella pneumophila* urinary antigen) were negative.

DISCUSSION

O. urethralis is an aerobic Gram-negative coccobacillus which was formerly classified within the genus *Moraxella* (2). The genus *Oligella* was defined in 1987 and comprises two species, *O. urethralis* and *O. ureolytica* (2). Based on comparative 16S rRNA gene

FIG 2 Pictures of the bacterial culture of the protected bronchial sample. (A and B) After a 48-h incubation at 37°C under a 5% CO₂-enriched atmosphere, pure culture of small nonhemolytic nonpigmented odorless colonies at a density of 10⁵ CFU/ml was detected on the chocolate agar with PolyVitex (A) and Columbia agar with 5% horse blood (B), corresponding to the strain Brest (GenBank accession number [MH285271](#)) of *Oligella urethralis*. (C) Colony Gram stain showed Gram-negative coccobacilli.

analysis, *Oligella* belongs to the *Betaproteobacteria*; the genera *Brackiella*, *Pelistega*, and *Taylorella* are phylogenetic neighbors. *O. urethralis* is mostly found as a commensal organism and has not been commonly described as an infectious disease agent. However, a few cases of infection have been reported to date, suggesting that it could be responsible for human infections in patients with underlying conditions (2–4). *O. urethralis* is predominantly considered a commensal of the human genitourinary tract, which is also the main infection site. There has been only one report of its presence within the respiratory tract of a patient with cystic fibrosis (5). The second species of the *Oligella* genus, *O. ureolytica*, was also previously isolated in the respiratory tract of patients with cystic fibrosis (5, 6). Therefore, the genus *Oligella* may display a tropism for the lower pulmonary tract. One article reported *O. urethralis* in the ear, nose, and throat (ENT) region, suggesting that it could be an upper respiratory tract commensal, and thus, ENT could possibly be a reservoir of *O. urethralis* lower respiratory tract infection, as in the present case (7). In the present case, the strain was isolated in pure culture in a significant amount (10^5 CFU/ml) in a high-quality specimen (protected bronchial specimen with numerous neutrophils and bronchial cells) in a man with a pulmonary abscess; nonetheless, we could not exclude the possibility of carriage without pathogenic significance of this isolate or contamination by the upper respiratory tract during the sampling. Indeed, further case reports are required before asserting the pathogenic role of *O. urethralis* in the pulmonary tract.

Infections caused by *Oligella* spp. usually occurred in patients with underlying conditions, especially with a source of immunosuppression, such as malignancy, as in the present case. Given the growing number of immunocompromised patients worldwide, we assume that this opportunistic pathogen may become an emerging pathogen. *Oligella* strains usually grow on nutrient agar and rather slowly. On ordinary blood medium, colonies are small and are opaque to whitish. The incubation period is long (up to 4 days), and not all laboratories incubate cultures for that long, especially for urinary tract infection. Gram staining is of particular interest for bacteriological analysis and should be performed whenever infection is suspected (based on clinical and/or cytological data as significant neutrophil count). Indeed, in the case of presence of a Gram-negative coccobacillus on Gram staining, enriched agar plates, such as blood agar, should be inoculated and incubated longer (at least 2 days). In the present case, no colonies were observed the day after inoculation (after 12 h of incubation), but small colonies appeared after 2 days (Fig. 2). Conventional biochemical reactions used for identification generally fail to separate *O. urethralis* from similar organisms. Although the genus *Oligella* is genetically distinct from both *Moraxellaceae* and *Neisseriaceae*, it shares with them many phenotypic characteristics commonly used for organism identification and shares high genetic and phenotypic relationships with other closer species, like those of *Alcaligenes*, *Bordetella*, or *Taylorella*. Biochemical tests indicate that *O. urethralis* is catalase and oxidase positive, nonmotile, urease negative, and asaccharolytic and fails to reduce nitrate to nitrite (2). No pigments and no odor are produced, colonies are nonhemolytic, and *Oligella* strains harbor a biochemical inertness with only a few compounds metabolized, which renders its identification difficult (2). Therefore, as the biochemically based diagnostic of *O. urethralis* identification is unreliable, the number of *O. urethralis*-induced infections may have been underestimated. Nowadays, MALDI-TOF MS technology offers rapid and reliable identification, including for this species (5, 8–10). Indeed, studies comparing MALDI-TOF MS to nucleic acid sequence-based identification highlight a good performance of MALDI TOF MS technology, with no discrepancies observed (5, 8–10). In the present case, the identification was successful by MALDI-TOF MS (MALDI Biotyper; Bruker Daltonics), as it was confirmed by 16S rRNA gene sequencing.

O. urethralis strains are generally susceptible to most antibiotics, including penicillin, aminoglycosides, and trimethoprim-sulfamethoxazole, unlike *O. ureolytica* strains, which are susceptible to a limited number of antibiotics (2). However, *O. urethralis* β -lactamase-producing strains have been previously described; the β -lactamases were penicillinase, cephalosporinase, or carbenicillin-hydrolyzing β -lactamase. Cephalospo-

rinase and carbenicillin-hydrolyzing β -lactamase were related to the *ampC* gene of *Acinetobacter baumannii* identified in one isolate (4, 11). Most of the previously described *O. urethralis* strains were resistant to fluoroquinolones. This resistance is particularly frequent for this species but not intrinsic, given the presence of sensitive strains. In the light of these data, fluoroquinolones should not be used for this organism without antibiotic susceptibility testing. Considering its ability to acquire resistance, including from phylogenetically unrelated bacterial species, it seems that *O. urethralis* is able to acquire exogenous elements by horizontal gene transfer from other species (11). The outcome of *O. urethralis* infections is usually favorable (3, 4). In the present case, the patient died; the underlying disease (lung cancer) could largely explain this fatal case. Although *O. urethralis* has been described as a low-virulence species so far, it might become an emerging opportunistic pathogen considering the increasing number of immunosuppressed patients worldwide.

SELF-ASSESSMENT QUESTIONS

1. What is the usual habitat of *Oligella urethralis*?
 - a. Conjunctiva
 - b. Genitourinary tract
 - c. Digestive tract
 - d. Skin
2. Which one of the following items is true concerning *Oligella* identification?
 - a. Biochemically, *Oligella* strains are rather inert
 - b. *Oligella* spp. are fast-growing bacteria
 - c. Colonies are typical with a specific pigment and odor
 - d. MALDI-TOF MS does not allow *Oligella* identification
3. *Oligella urethralis* is usually resistant to which antibiotics?
 - a. Aminoglycosides
 - b. Trimethoprim-sulfamethoxazole
 - c. Fluoroquinolones
 - d. Cephalosporins

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