Journal of Microbiology, Immunology and Infection (2019) 52, 167–169

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.e-jmii.com

Correspondence

Early prosthetic joint infection due to *Ureaplasma urealyticum*: Benefit of 16S rRNA gene sequence analysis for diagnosis

KEYWORDS
Prosthetic joint infection;
Ureaplasma urealyticum;
16S rRNA gene;
Molecular diagnosis

Abstract Detection of the most frequently bacteria involved in prosthetic joint infection (PJI) is usually performed by conventional cultures. We report a case of early PJI due to *Ureaplasma urealyticum*, diagnosed by 16S rRNA gene sequence analysis, which highlights the interest of molecular methods if fastidious bacteria are involved in PJI.

Dear Editor,

Prosthesis joint infection (PJI) is one of the most serious complication of prosthesis implantation and its bacterial documentation is critical for appropriate antibiotherapy. *Ureaplasma urealyticum* is a human urogenital pathogen rarely involved in PJI, which can not be detected by conventional culture methods due to its specific culture conditions requirement.[1] Here we report a case of an early PJI due to *U. urealyticum*, which was identified by molecular biology, secondarily to negative conventional cultures.

A 88-year-old man underwent left hemiarthroplasty for a femoral neck fracture. On the 6th postoperative day, he was diagnosed with acute urinary retention. Urinary drainage was performed and ceftriaxone treatment was initiated. On postoperative day 40, the patient experienced a painful hip preventing him from walking. Examination of the hip showed a purulent swelling and an inflammatory scar but no fever. Multiple irrigations with pulsatile lavage of the implanted hip and retention of the arthroplasty were performed. Specimens were collected intraoperatively and submitted for aerobic, anaerobic and broth cultures. An empirical antimicrobial treatment with meropenem and daptomycin was initiated. Following negative conventional cultures, direct 16S rRNA gene amplification and sequence analysis were performed on frozen specimens. A portion of the 16S rRNA gene was amplified, using universal primers which correspond to positions 8–27 and 1384–1400 using *Escherichia coli* numbering, respectively.[2] The sequence was analyzed with the Bio Informatics Bacterial Identification (BIBI) database. All the 5 per-operative samples were positive for *U. urealyticum* (Genbank accession no MF372933). Secondary cultures were performed using A7 agar (bioMerieux) and broth media adapted to ureaplasma (Fig. 1).[1] Two specimens were positive by specific cultures and the species identification of *U. urealyticum* was confirmed using a specific real-time PCR.[3] Minimum inhibitory concentrations (MICs) of levofloxacin, moxifloxacin, tetracycline, and doxycycline were then determined using a broth dilution method and showed susceptibility of the isolate with MICs of 1 μg/ml, 0.25 μg/ml, 0.5 μg/ml and 0.12 μg/ml, respectively.[1] Unfortunately, the patient died of multiple comorbidities before the antimicrobial treatment could have been adapted.

Ureaplasma spp. belongs to the class *Mollicutes* and are one of the smallest free-living organisms. Recently, they have been classified into two species, *U. urealyticum* and *Ureaplasma parvum*. A recent meta-analysis in men supports that only *U. urealyticum* is an etiological agent of

https://doi.org/10.1016/j.jmii.2017.07.017

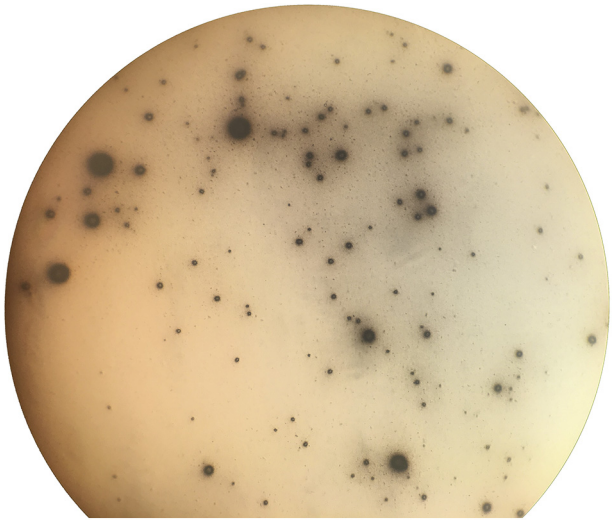

Figure 1. *Ureaplasma urealyticum* colonies on A7 agar (bioMerieux) visualized with binocular microscope (magnification ×125).

nongonococcal urethritis.[4] *U. urealyticum* has been described in septic arthritis or polyarthritis in immunocompromised patients, but PJI are uncommon and to our knowledge, only two cases have been reported.[5,6] Both were late PJIs, and one occurred in an immunocompromised patient.[6] Thus this is the first description of an early PJI as defined by the IDSA, because occurring within 1—3 months after surgery.[7]

U. urealyticum has limited biosynthesis abilities and *in vitro* culture requires a specific complex growth media.[1] However, such media are not routinely performed on perioperative samples for PJI due to the rare occurrence of this bacteria. Molecular methods can also be used for identification of ureaplasmas such as 16S rRNA gene sequence analysis. Guidelines about management of PJI recommend starting empirical broad spectrum antibiotic therapy quickly before pathogen identification. Used regimens often contain β-lactams, vancomycin or daptomycin, which are not active antibiotics against *U. urealyticum* due to the lack of a cell wall. On the opposite, this species is susceptible to tetracyclines and fluoroquinolones (MIC of moxifloxacin being lower than that of levofloxacin), doxycycline being the most potent molecule. However, resistance has recently been reported for both antibiotics. Thus, performing specific cultures after molecular biology results is of importance for susceptibility testing.

Although uncommon, PJI due to *U. urealyticum* should be considered and molecular methods with large screening such as 16S rDNA sequence analysis should be performed for PJI diagnosis when traditional culture remains negative despite a clinical suspicion of infection. This is of great importance especially to adapt empirical treatment.

Conflict of interest statement

All authors declare no conflicts of interest.

References

1. Waites KB, Bébéar CM, Roberston JA, Talkington DF, Kenny GE. Laboratory diagnosis of mycoplasmal infections. In: *Cumitech 34.* vol. 34. Washington D. C.: American Society for Microbiology; 2001.
2. Lo Presti F, Riffard S, Vandenesch F, Reyrolle M, Ronco E, Ichai P, et al. The first clinical isolate of *Legionella parisiensis*, from a liver transplant patient with pneumonia. *J Clin Microbiol* 1997; **35**:1706—9.
3. Yi J, Yoon BH, Kim E-C. Detection and biovar discrimination of *Ureaplasma urealyticum* by real-time PCR. *Mol Cell Probes* 2005;**19**:255—60.
4. Zhang N, Wang R, Li X, Liu X, Tang Z, Liu Y. Are *Ureaplasma* spp. a cause of nongonococcal urethritis? A systematic review and meta-analysis. *PloS One* 2014;**9**, e113771.
5. Sköldenberg OG, Rysinska AD, Neander G, Muren OH, Ahl TE. *Ureaplasma urealyticum* infection in total hip arthroplasty leading to revision. *J Arthroplasty* 2010;**25**:1170. e11-1170.e13.
6. Roerdink RL, Douw CM, Leenders ACAP, Dekker RS, Dietvorst M, Oosterbos CJM, et al. Bilateral periprosthetic joint infection with *Ureaplasma urealyticum* in an immunocompromised patient. *Infection* 2016;**44**:807—10.
7. Osmon DR, Berbari EF, Berendt AR, Lew D, Zimmerli W, Steckelberg JM, et al. Diagnosis and management of prosthetic joint infection: clinical practice guidelines by the Infectious Diseases Society of America. *Clin Infect Dis Off Publ Infect Dis Soc Am* 2013;**56**:e1—25.

Caroline Rouard
APHP, Hôpital Antoine Béclère, Service de Bactériologie-Hygiène, Clamart, France

Université Paris Sud, Faculté de Pharmacie, UBAPS, Chatenay-Malabry, France

Sabine Pereyre
Univ. Bordeaux, CHU de Bordeaux USC-EA 3671 Infections humaines à mycoplasmes et chlamydiae, Centre National de Réference des Infections Sexuellement Transmissibles, INRA, Bordeaux, France

Sophie Abgrall
APHP, Hôpital Antoine Béclère, Service de Médecine Interne, Clamart, France

Christelle Guillet-Caruba
APHP, Hôpital Antoine Béclère, Service de Bactériologie-Hygiène, Clamart, France

Pierre Diviné
APHP, Hôpital Antoine Béclère, Service de Chirurgie Orthopédique, Clamart, France

Nadège Bourgeois-Nicolaos
APHP, Hôpital Antoine Béclère, Service de Bactériologie-Hygiène, Clamart, France

Université Paris Sud, Faculté de Pharmacie, UBAPS, Chatenay-Malabry, France

Sandrine Roy
APHP, Hôpital Antoine Béclère, Service de Pharmacie à Usage Intérieur, Clamart, France

Véronique Mangin d'Ouince
APHP, Hôpital Corentin Celton, Service de Gériatrie, Issy-les-moulineaux, France

Cécile Bébéar
Univ. Bordeaux, CHU de Bordeaux USC-EA 3671 Infections humaines à mycoplasmes et chlamydiae, Centre National de Réference des Infections Sexuellement Transmissibles, INRA, Bordeaux, France

Thierry Bégué
APHP, Hôpital Antoine Béclère, Service de Chirurgie Orthopédique, Clamart, France

Florence Doucet-Populaire*
APHP, Hôpital Antoine Béclère, Service de Bactériologie-Hygiène, Clamart, France

Université Paris Sud, Faculté de Pharmacie, UBAPS, Chatenay-Malabry, France

*Corresponding author. 157 rue de la Porte de Trivaux, 92141 Clamart, France. Fax: +33 146326796.
E-mail address: florence.doucet-populaire@aphp.fr

15 June 2017
Available online 24 October 2017