Bordetella petrii recovered from chronic pansinusitis in an adult with cystic fibrosis

Laura Biederman
Department of Pathology, Anatomy and Cell Biology, Sidney Kimmel Medical College at Thomas Jefferson University,
laura.biederman@jefferson.edu

Marc Rosen MD
Department of Otolaryngology-Head and Neck Surgery, Sidney Kimmel Medical College at Thomas Jefferson University,
marc.rosen@jefferson.edu

Brent S. Bobik
Department of Pathology, Anatomy and Cell Biology, Sidney Kimmel Medical College at Thomas Jefferson University

Amity L. Roberts, PhD, D(ABMM)
Department of Pathology, Anatomy and Cell Biology, Sidney Kimmel Medical College at Thomas Jefferson University,
amity.roberts@jefferson.edu

Let us know how access to this document benefits you
Follow this and additional works at: http://jdc.jefferson.edu/pacbfp
Part of the Pathology Commons

Recommended Citation
Biederman, Laura; Rosen, Marc MD; Bobik, Brent S.; and Roberts, PhD, D(ABMM), Amity L., "Bordetella petrii recovered from chronic pansinusitis in an adult with cystic fibrosis" (2015).
Department of Pathology, Anatomy and Cell Biology Faculty Papers. Paper 178.
http://jdc.jefferson.edu/pacbfp/178
Case Report

**Bordetella petrii** recovered from chronic pansinusitis in an adult with cystic fibrosis

Laura Biederman a, Marc R. Rosen b, Brent S. Bobik a, Amity L. Roberts a,*

*a Department of Pathology, Anatomy and Cell Biology, Sidney Kimmel Medical College at Thomas Jefferson University, Pavilion Building, Suite 207, Philadelphia, PA 19107, USA
b Department of Otolaryngology–Head and Neck Surgery, Sidney Kimmel Medical College at Thomas Jefferson University, 925 Chestnut Street, 6th Floor, Philadelphia, PA 19107, USA

**A B S T R A C T**

To date **Bordetella petrii** has infrequently been identified within the clinical setting likely due to the asaccharolytic nature of this organism. We present a case of **B. petrii** recovered on two separate events in a patient with adult cystic fibrosis experiencing chronic sinusitis.

© 2015 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).

**Case report**

We present a 41-year old female with a 20 plus year history of nasal obstruction and chronic sinusitis. Her clinical history indicated velopharyngeal insufficiency (incomplete closure of the velopharyngeal sphincter between the oropharynx and the nasopharynx), severe gastroparesis, significant gastric reflux and asthma contributed to a confirmed cystic fibrosis mutation, ΔF508 gene. Individuals diagnosed with adult cystic fibrosis frequently experience gastroparesis, asthma and chronic sinusitis [1,2].

Historically, the patient underwent several surgical interventions, multiple rounds of antimicrobials, decongestants, antihistamines, topical and oral steroids without improvement of her diffuse pansinusitis. In an attempt to alleviate her chronic sinusitis, revision endoscopic sinus surgery with septoplasty and a turbinectomy was performed during early 2014 (day 0). A right maxillary sinus tissue specimen was sent for aerobic bacterial culture, which was incubated aerobically only with 5% CO₂ at 35 °C. The specimen Gram-stain showed few white-blood cells and no organisms. Twenty-four hours post-incubation, moderate growth of a tiny Gram-negative colony was noted on trypticase soy agar with 5% sheep blood (Becton, Dickinson and Company, Franklin Lakes, NJ). No other organisms were recovered. By 48 h, growth was noted on the MacConkey agar (Becton, Dickinson and Company, Franklin Lakes, NJ). The isolate was identified by the Bruker Biotyper MALDI-TOF MS system (Bruker Daltonics Inc., Billerica, MA) as **Bordetella petrii** (score 2.13; highly probable species identification). Since the organism had not been validated by this method, the isolate was tested by the Microscan NBPC30 panel for oxidase positive organisms (Siemens Medical Solutions USA, Inc., Malvern, PA) and the Remel RapID NF PLUS System (Thermo Fisher Scientific Remel Products, Lenexa, KS). The NBPC30 panel identified the organism as **Alcaligenes** species (00064326) 79.12%. The RapID system identified the organism as **Alcaligenes xylosoxidans** (210606) Implicit. Both **B. petrii** and **Alcaligenes** species are asaccharolytic organisms and part of the **Alcaligenaceae** family [3]. The isolate exhibited the following phenotypic characteristics: non-motile; oxidase, catalase, and nitrate positive; urea negative; malate, tartrate and citrate positive, this phenotype is consistent throughout literature [3–6]. For more stringent confirmation, 16S rRNA sequencing was performed at ARUP laboratories and provided an identification of **B. petrii** (Salt Lake City, UT). No standard antibiotic susceptibility guidelines are defined for this organism; however, antimicrobial susceptibility test (AST) results for the two isolates are shown in Table 1 for epidemiologic strain differentiation.

http://dx.doi.org/10.1016/j.idcr.2015.09.004
2214-2509/© 2015 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).
There has been a limited number of case reports with *B. petrii* defined as the etiologic agent [4,5,7–10]. *B. petrii* has been implicated as the causative agent in cases of mandibular osteomyelitis, chronic suppurative mastoiditis, chronic pulmonary obstructive disease and persistent bronchiectasis [4,8–10]. Importantly, it has been previously isolated from in cystic fibrosis patients [5,7].

Because it is uncommon, or likely misidentified, accurate identification of *B. petrii* represents a challenge for traditional automated identification systems. These biochemical or enzymatic systems are only marginally effective, due to the lack of a distinct biochemical carbohydrate profile as well as limited or uncurated databases. Not only was *B. petrii* mis-identified by MicroScan (NBPC30) and rAPD panels in the two described occasions for this patient, but it was also misidentified in other reported cases [10]. Studies show that *Bordetella* species are closely related to *Achromobacter* (*Algaegenes*) species [6,11]. The case patient had two sinus isolates identified three years prior as *Achromobacter* species (90%) by the BD Phoenix NMIC/ID-124 panel (Becton-Dickinson, Sparks, MD). Unfortunately, these isolates are no longer available to determine if they were misidentified. The gold standard method for identification of *B. petrii* is 16S rRNA sequencing [4,8,10]. At that time the patient was treated post-operatively with 1000 mg of ceftazolin (MIC > 16 mg/mL), indicating inadequate coverage.

The importance of *B. petrii* as a clinical pathogen has not been well established; however, it has been described in cystic fibrosis patients [1,2,5,7]. *B. petrii* has been demonstrated to persist despite treatment in patients, as was potentially noted with her previous isolates of *Achromobacter* species [7,10]. By using the MALDI-TOF methodology the clinical laboratory can achieve not only quicker but more accurate organism identifications. More accurate identification can lead to more appropriate treatment and provide insight into the true clinical prevalence of organisms like *B. petrii*, which have been shown to be resilient colonizers especially within cystic fibrosis patients [7,10].

Acknowledgements

No conflicts of interest. No grant funding was utilized for this publication.

References