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Prosthetic Valve Endocarditis Caused by a *Pasteurella dagmatis*-Like Isolate Originating from a Patient's Cat

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***Pasteurella* species are part of the oral flora of cats and dogs. In humans, they are frequently found in infected animal bite wounds, but invasive infections are rare. This is the first report of prosthetic-valve endocarditis with a *Pasteurella dagmatis*-like species, which originated from the patient's cat.**

CASE REPORT

A 77-year-old man with an aortic bioprosthesis (Shelhigh, 25 mm; Shelhigh, Inc., Millburn, NJ) implanted 5 years ago was admitted to the hospital with a sudden onset of fever and chills. Five months prior to admission, a first episode of prosthetic valve endocarditis due to *Enterococcus faecalis* had been successfully treated with intravenous antibiotics for 6 weeks without valve replacement (amoxicillin at 2 g every 6 h plus gentamicin at 120 mg twice a day for 2 weeks, followed by daptomycin at 8.5 mg/kg of body weight once daily for the remaining 4 weeks). Two weeks after the end of treatment, control blood cultures were negative and the patient had fully recovered. However, a transesophageal echocardiogram (TEE) demonstrated an aortic paravalvular leak. The patient was immunocompetent and had an unremarkable medical history except for chronic atrial fibrillation. On admission, he was febrile (38.6°C), tachycardic (105/min), and hypotensive (94/47 mm Hg). Physical examination revealed congestive heart failure and a systolic and diastolic murmur. Laboratory studies showed leukocytosis (16.4×10^9 /liter), thrombocytopenia (84×10^9 /liter), elevated creatinine levels (224 μ mol/liter), and a C-reactive protein level of 242 mg/liter. TEE demonstrated a severe aortic insufficiency, a large aortic vegetation, and an extensive paravalvular leak due to dehiscence of the bioprosthesis valve ring involving half the circumference. Blood cultures yielded small Gram-negative coccobacilli, identified as *Pasteurella pneumotropica* by the commercial phenotyping methods Vitek 2 (bioMérieux Suisse SA, Geneva, Switzerland) and API 20NE system (bioMérieux Suisse SA, Geneva, Switzerland). To confirm identification, 16S rRNA gene sequencing of the patient's isolate, 400127/2011, was performed. A Basic Local Alignment Search Tool (BLAST) search revealed >99.9% similarity to a *Pasteurella dagmatis*-like species (GU177868 and GU177869) and to GenBank entry AF224296, assigned to *Pasteurella pneumotropica* strain NCTC 10827. Treatment with ceftriaxone was initiated, with a later switch to penicillin at 5 million units every 6 h after obtaining the results of susceptibility testing. Four weeks after the start of treatment, aortic valve and aorta ascendens replacement by a homograft was necessary due to progressive valve destruction. Since cultures of the resected bioprosthetic valve were negative, antibiotic treatment was stopped 2 weeks after valve replacement. The patient's condition gradually improved. Two months after surgery, control blood cultures were negative; a follow-up TEE showed normal valve function, and the patient was in good clinical condition. Eight months after surgery, the patient had

fully recovered, and computed tomography of the aortic arch as well as TEE revealed no pathological findings.

The patient owned an 18-year-old cat but had not experienced a bite or scratch recently. However, the cat often licked the patient's hands, which were affected by a pruritic skin eruption 1 week prior to the onset of the illness. A swab from the cat's oral cavity was performed. From the oral mixed flora, two *Pasteurella* morphotypes could be isolated and were further characterized. 16S rRNA gene sequencing revealed identical sequences of the two *Pasteurella* strains from the cat's mouth and the patient's blood culture isolate, with >99.9% similarity to a *Pasteurella dagmatis*-like species (GU177868 and GU177869). Pulsed-field gel electrophoresis (PFGE) after DNA digestion with XbaI (4) demonstrated the clonal identity of the feline and human isolates (Fig. 1). As controls, we used the independent *P. dagmatis*-like strain JF5098 and the *Pasteurella pneumotropica* type strain DSM 21403^T.

Human infections with *Pasteurella* species are most often caused by dog and cat bites resulting in locoregional infections. *Pasteurella multocida* is the most frequently isolated species; *P. dagmatis* has been isolated in only 4 to 7% of cases (1, 15). Systemic disease is uncommon and mostly occurs in patients with underlying comorbidities (17). Association of *P. dagmatis* with invasive human infection is exceedingly rare. We found 10 published cases to date, including two cases of native valve and one case of prosthetic valve endocarditis (2, 3, 5–8, 10, 12, 14, 16). In 8 out of 10 cases, direct contact with cats or dogs was confirmed. Ways of contact were bites, scratches, licking, or simply close animal contact. In all three cases of endocarditis, *P. dagmatis* was identified by conventional biochemical methods that do not differentiate between other, closely related *Pasteurella* species. The common risk factors for invasive infections or endocarditis were either a predisposing heart disease or an immunocompromised host. It can be concluded that detailed patient interviewing with

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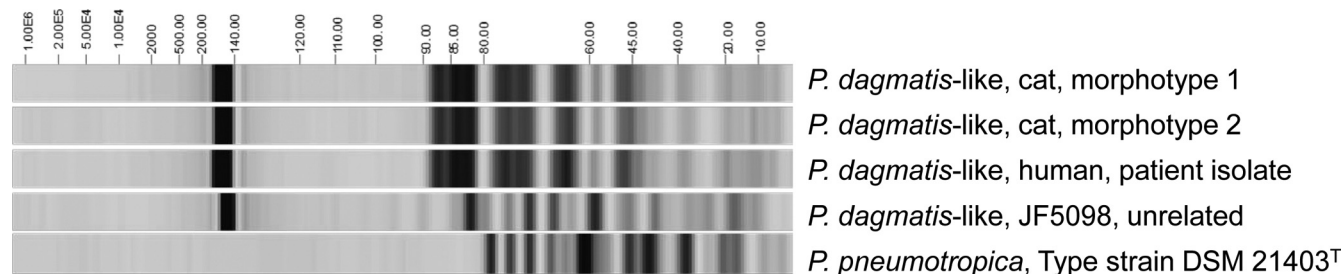


FIG 1 Pulsed-field gel electrophoresis after DNA digestion with XbaI, demonstrating identity of the *Pasteurella dagmatis*-like isolates from the human patient and the cat's oral cavity (two morphotypes). The independent *P. dagmatis*-like strain JF5098 and the *Pasteurella pneumotropica* type strain DSM 21403^T were used as controls.

regard to animal contacts and knowledge of the association of *Pasteurella* species and endocarditis are the clues to diagnosis.

Pasteurella species of animal origin are often misidentified using commercial phenotypic identification systems since these focus on clinically relevant species. For exact identification, additional molecular diagnostic tests may be necessary (9). Nevertheless, as seen in our case, even 16S rRNA gene-based identification can be misleading if GenBank entries are associated with wrong species designations. Besides a high similarity of our clinical isolate with *P. dagmatis*-like species, a 100% match was seen with the 16S rRNA GenBank entry AF224296 of *P. pneumotropica* NCTC 10827. However, this strain is wrongly assigned to the species *P. pneumotropica*, since its 16S rRNA gene shows only 93.6% similarity to that of the *P. pneumotropica* type strain (GenBank accession no. AY362924). In fact, Sellyei et al. (13) showed that *P. pneumotropica* NCTC 10827 is part of the same taxonomic group as the *P. dagmatis*-like isolates they described. *P. dagmatis*-like strains, including our human isolate, form a monophyletic group closely related to—but still distinct from—*P. dagmatis* and might define a new *Pasteurella* species (13). Similar observations were made by Krol et al. (11), who postulate that *P. dagmatis* is a genetically heterogeneous species with at least two host-specific lineages. Our case further supports the existence of a *P. dagmatis*-like species associated with cats.

In conclusion, this is the first report of a *Pasteurella dagmatis*-like species isolated from a human. This putative new species is part of the oral flora of cats, and infections may develop in patients with close contact to pet animals, even without a history of bites or scratches. In our patient, it caused severe invasive disease with prosthetic-valve endocarditis, leading to aortic valve and aorta ascendens replacement. The species was misidentified by commercial phenotypic systems. The case also highlights that genetic identification based on 16S rRNA gene sequences has to be assessed carefully due to possible wrong species designations associated with GenBank entries.

Nucleotide sequence accession number. The 16S rRNA gene sequence of isolate 400127/2011 was deposited in GenBank under accession no. JF706218.

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