

## COMPANION/PET ANIMALS

Septic monoarthritis with isolation of *P dagmatis* as a monoculture in the stifle joint of a dogJos Bongers,<sup>1</sup> Lucinda van Stee,<sup>1</sup> Leonie van Bruggen,<sup>1</sup> Els M Broens<sup>2</sup><sup>1</sup>Companion Animal Medicine, Universiteit Utrecht, Utrecht, The Netherlands<sup>2</sup>Veterinary Microbiological Diagnostic Center (VMDC), Utrecht University, Utrecht, The Netherlands**Correspondence to**Dr Jos Bongers;  
josbongers89@gmail.comReceived 15 August 2018  
Accepted 20 September 2018**SUMMARY**

A seven-month-old male cane corso was presented to our emergency clinic, with severe left hind lameness. The combination of history, physical examination, radiographs and cytology of the left stifle raised a suspicion of a septic monoarthritis. Bacteriology of the synovia confirmed an infection with *Pasteurella dagmatis*. *Pasteurella* species are frequently associated with skin disease and often isolated from dog bite wounds in humans. Isolation of *P dagmatis* only incidentally occurs and its frequency might be underestimated due to laboratory misidentification. Its pathogenicity remains unknown and is presumed to be equal to other *Pasteurella* species. However, in humans, this organism is associated with more serious disease, which might potentially also be the case in our patient. To the author's knowledge, this is the first case report of a monoculture of *P dagmatis* isolated from the joint of a dog.

**BACKGROUND**

*Pasteurella* species are commensals in the oral cavity of dogs and cats. *Pasteurella* species are frequently associated with skin and soft tissue infections in humans after an animal bite or licking incident. While *Pasteurella multocida* is the most recurrent bacterium found in human and dog infections,<sup>1,2</sup> other species such as *P dagmatis* and *P canis* are also incidentally described as dual infections in humans.<sup>3,4</sup> Commercial automatic systems are frequently used for identifying the *Pasteurella* genus. These systems are often incompetent to identify *P dagmatis* as a separate species.<sup>5,6</sup> This case report describes the clinical relevance of *P dagmatis* as a monoculture isolated from the synovia of a dog. We also report shortly the challenges of standard identification methods for species within the *Pasteurella* genus.

**CASE PRESENTATION**

A previously healthy seven-month-old male cane corso with severe left hind limb lameness was presented to our emergency clinic on October 19, 2014. The owners reported that the dog expressed (acute) discomfort a couple of days prior to presentation and subsequently walked on three legs the next day. The orthopaedic examination showed a tiptoe position and extreme lameness of the left hind limb. The stifle was warm, effused and painful on palpation. The overlying skin itself was unremarkable. All neurological reflexes were within normal limits, and all other joints seemed unaffected on orthopaedic examination.

**INVESTIGATIONS**

Radiographs of the left stifle revealed a severely distended stifle joint with suspicion of osteolysis in the region of the axial aspect of the lateral, femoral condyle. This finding was suggestive of a possible septic arthritis or synovitis (figure 1). Bacteriological culture and cytology were performed on the synovia of the left stifle joint. Bacteriology was performed using the standard protocol, being inoculation in duplicate on blood agar (BA) (BioTrading, the Netherlands) for both aerobic and anaerobic incubation and inoculation on MacConkey agar (BioTrading). All plates were incubated overnight at 37°C. Bacteriology resulted in a pure culture on both BA plates; no growth was seen on the MacConkey plate. Gram-staining revealed a Gram-negative rod, and identification using matrix-assisted laser desorption/ionisation and time of flight mass spectrometry resulted in *P dagmatis*. The isolate was susceptible to all antimicrobials tested (table 1).

Cytology of the synovia of the left stifle revealed many non-degenerated polymorphonuclear leucocytes with no intracellular bacteria, which was considered to be an exudative arthritis. Synovia was also collected from the right stifle, which showed signs of degenerative joint disease. The radiographs of the left stifle were repeated during hospitalisation and additionally showed changes mainly visible in the distal tibia, radius and ulna suggestive of hypertrophic osteodystrophy (HOD). Antibody assessment for infectious agents including Borrelia IgG and Erlichia IgG titres was performed but came back negative.

**TREATMENT**

The dog was diagnosed with a septic monoarthritis and initially treated intravenous with amoxicillin and clavulanic acid (Amoxicilline/Clavulaanzuur Sandoz; Sandoz) 20 mg/kg three times a day and carprofen (Carporal; AST farma) 4 mg/kg once a day.

The dog was hospitalised for a total of five days, and therapy (amoxicillin and clavulanic acid (Synulox; Zoetis Belgium) 12.5 mg/kg twice a day and carprofen (Carporal; AST farma) 2 mg/kg twice a day) was continued orally at home for three weeks.

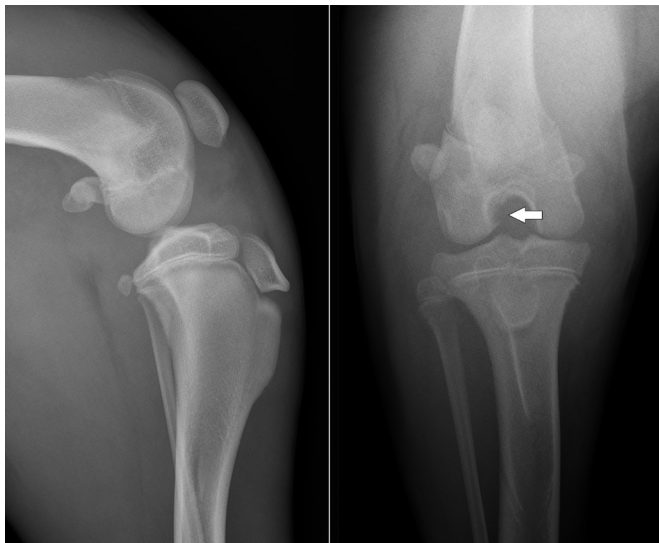
**OUTCOME AND FOLLOW-UP**

The dog returned for revisits at day 4, day 7, day 74, day 214 and day 228, after hospitalisation. The patient's clinical presentation improved at the second revisit, and repeated cytology was



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**Figure 1** Mediolateral (ML) and caudocranial (CdCr) radiographic views of the left stifle at presentation show increased soft tissue opacity in the joint with cranial displacement of the fat pad and vaguely defined contour of the lateral condyl, suggesting osteolysis (white arrow).

unremarkable. There was no indication for an active infection, and the antibiotics and NSAIDs were discontinued after three weeks of treatment. However, at the third revisit, the patient's clinical presentation had not improved as expected. The dog was still moderately lame in his left hind limb with minor improvement. On day 214, the lameness showed no further improvement.

Radiographs obtained at several revisits showed progressive bone loss at the axial aspect of the lateral femoral condyle and around the intercondyloid fossa, progressive degenerative joint disease (with intraarticular increase of soft tissue opacity), progressive development and partial resolution of HOD-related changes and the development of an osteochondrosis lesion (figure 2). Because of the lack of clinical improvement and the possibility of a recurrent infection, an MRI study was performed of the left stifle. Images showed multiple cystic structures in the synovia, subchondral bone loss in the cranial and lateral aspects of the intercondyloid fossa and osteochondrosis (subchondral bone loss at the articular surface) of the lateral femoral condyle (figure 3). Differential diagnosis for the cystic lesions in the stifle joint included degenerative joint disease and an intraosseus ganglion cyst. The cruciate ligaments and menisci were found to be unremarkable. Potential treatment options were discussed with the owners. Eventually, the owners opted a conservative management without medication, and they were advised to



**Figure 2** CdCr radiographic view of the left stifle at fourth revisit shows progressive degenerative joint disease and the development of an osteochondrosis lesion.

consider surgery in case the lameness persisted or deteriorated. During the next year, the lameness progressively worsened, and the owner elected euthanasia. No postmortem examination was performed.

## DISCUSSION

*P dagmatis* is a Gram-negative coccobacillus, relatively unfamiliar for many clinicians. It can be found in the normal oral and gastrointestinal flora of cats and dogs. *Pasteurella* species are frequently isolated from dog or cat bites in humans or dogs.<sup>7</sup> Licking of intact or impaired skin is the most common porte d'entrée for oral and nasal pathogens.<sup>8,9</sup> In our case, the arthritis might primarily be caused by licking the skin or by a low grade bacteraemia originating from the oral cavity of the dog.

To the best of our knowledge, this is the first case report in the English-language medical literature of a *P dagmatis*

**Table 1** Analysis performed using 16S rRNA gene sequence analysis and matrix-assisted laser desorption/ionisation and time of flight mass spectrometry systems

Antibiotic	Interpretation
Amoxicilin+clavulanic acid	Sensitive
Ampicilin	Sensitive
Cephalexin	Sensitive
Enrofloxacin	Sensitive
Gentamicin	Sensitive
Tetracyclin	Sensitive
Sulfamethoxazole-trimethoprim	Sensitive



**Figure 3** Sagittal MRI (WARSFFDR sequence) of left femur, midsagittal plane, shows subchondral bone loss in the distal femur.

isolation from the joint of a dog.<sup>2,3</sup> Currently, three articles have studied the prevalence of bacteria isolated from non-infected and infected wounds of dogs. All studies describe isolates with different *Pasteurella* species, but *P dagmatis* was isolated in none of these cases. In the first study by Kelly and others<sup>10</sup>, the isolates were only cultured aerobically, and the antibiotic sensitivities of the pathogens were determined by disc diffusion assay. In the second two studies of Griffin and Holt<sup>8</sup> and Meyers and others<sup>11</sup>, the isolates were identified with help of Analytic Profile Index tests (API) by BioMerieux. *P dagmatis* is not registered in the identification table of API 20 NE, and thus this method is not able to identify the bacterium.<sup>3</sup> As this is a standard identification method, this could lead to a misidentification of *P dagmatis* and subsequently an underestimation of its frequency. A good knowledge of the abilities and the limits of commercial bacterial identification test is important for a clinical microbiologist since they have a key role in identifying and diagnosing bacterial diseases.

In humans, *P dagmatis* is associated with more serious disease such as endocarditis,<sup>9</sup> vertebral osteomyelitis,<sup>12</sup> spondylodiscitis<sup>13</sup> and systemic diseases including bacteraemia.<sup>14</sup> This implies that *P dagmatis* might be more pathogenic than other *Pasteurella* species and might be prone for causing complications. In our case, the dog had a monoarthritis, which was possibly complicated with HOD and a degenerative bone cyst. The underlying pathogenesis for HOD is unknown and might be multifactorial. One study found an *Escherichia coli* bacteraemia in a single HOD-affected dog, but they speculated that infection could have been secondary.<sup>15</sup> Cysts are characterised by a distinct membrane and clear division compared with the nearby tissue, which hypothetically could function as a reservoir

for recurrent infection. These factors could contribute to the poor functional outcome of the dog in our study.

Our case report emphasises that the clinical relevance of *P dagmatis* and its frequency should not be underestimated, and more research is indicated to obtain more information on its pathogenicity and occurrence. Although *P dagmatis* seems to be highly susceptible to many antibiotics similar to other *Pasteurella* species, early detection by potent identification methods is crucial. Not only for a favourable clinical outcome by possibly preventing more severe complications, but moreover it is of high importance as part of reducing antimicrobial resistance considering the one health problematic.

**Contributors** All persons who meet authorship criteria are listed as authors, and all authors certify that they have participated sufficiently in the work to take public responsibility for the content, including participation in the concept, design, analysis, writing or revision of the manuscript. Furthermore, each author certifies that this material or similar material has not been and will not be submitted to or published in any other publication before its appearance in the *Veterinary Record Case Reports*.

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