Official journal of the Spanish Society of Chemotherapy

Letter to the Editor

Revista Española de Quimioterapia
doi:10.37201/req/067.2022

Domingo Fernández-Vecilla[1,2]
Cristina Aspichueta-Vivanco[1,2]
José Luis Díaz de Tuesta-del Arco[1,2]

Cellulitis due to *Pasteurella stomatis* and *Actinomyces canis* following dog bite

[1]Clinical Microbiology Service. Basurto University Hospital. OSI Bilbao-Basurto, Bilbao (Biscay). Spain.
[2]Biocruces Bizkaia Health Research Institute. Biscay. Spain.

Article history
Received: 8 July 2022; Accepted: 16 August 2022; Published: 17 October 2022

Sir,

The *Pasteurella* genus consists of Gram-negative coccobacilli that form part of the commensal flora of dogs and cats, mainly. It is the cause of infection in many animal species, although it can also produce infections in humans, principally infections of the skin and soft tissues after bites, scratches or contact with animal saliva. *Actinomyces canis* is a previously isolated Gram-positive facultative anaerobe bacillus of dogs, but it had not been reported as a cause of infections in humans until now [1].

Patient of 12 years of age who suffered a dog bite in the left lower limb, being tended in his outpatient clinic by disinfection of the wound and oral antibiotic treatment with trimethoprim/ sulfamethoxazole and clindamycin (160 mg/800 mg/12 h y 600 mg/8 h, respectively). He did not have a medical history of interest except for suspicion of allergy to amoxicillin after a pruriginous skin reaction several years before. He stopped taking clindamycin due to oral intolerance, being examined by his doctor three days afterwards with evident phlogogenous signs consisting of the left lower limb being slightly oedematous, increase in temperature and perilesional erythema, as well as purulent secretion.

At this time he was sent to the emergency room, where the physicians observed four symmetrical wounds of around 1.5 cm with torn skin, regular edges, and bloody and purulent secretion. In addition, the perilesional area evidenced redness, heat and swelling, which encompassed up to 7x5 cm (figure 1A). The patient did not have fever or functional impairment. An ultrasound was performed which showed mild subcutaneous oedema with absence of collections or of involvement of deep muscle levels (figure 1B). Two samples were obtained from the wounds, being inoculated in chocolate and TSA with 5% of sheep blood agars in aerobiosis with 5% of CO_2, Brucella-blood agar in anaerobiosis, as well as CNA and McConkey agar in aerobiosis. A blood culture sample was also obtained that was left incubating during seven days. After conducting the provocation test with cephalosporins with negative result, he was admitted with intravenous treatment of cefotaxime and clindamycin (1.5 g/8 h and 600 mg/8 h, respectively). In the Gram tincture, polymicrobial flora was observed consisting of Gram-negative and Gram-positive bacilli. At 24h there was growth in chocolate agar and TSA with 5% of sheep blood (Figure 2), being identified through MALDI-TOF mass spectrometry (Bruker, Massachusetts, USA) as *Pasteurella stomatis* with a value of 2,24. In the following 24 hours, growth was observed in Brucella-blood agar (BD®) being again identified through MALDI-TOF MS as *A. canis* with a value of 2.23. The antibiotic susceptibility was performed through gradient strips or E-test® in Mueller-Hinton fastidious agar (BD®) for *P. stomatis* and E-test® in Brucella-blood (BD®) for *A. canis*. *P. stomatis* was susceptible to penicillin (MIC = 0.38 mg/L), amoxicillin/clavulanic acid (MIC = 0.38 mg/L), cefotaxime (MIC= 0.02 mg/L), doxycycline (MIC = 0.5 mg/L), ciprofloxacin (MIC = 0.06 mg/L) and trimethoprim/sulfamethoxazole (MIC = 0.125 mg/L). In turn, *A. canis* was susceptible to penicillin (MIC < 0.016 mg/L), amoxicillin/clavulanic (MIC < 0.016 mg/L) and clindamycin (MIC = 0.25 mg/L), and resistant to metronidazole (MIC > 32 mg/L).

It was later confirmed that the patient was not allergic to amoxicillin, receiving four more days of IV treatment with amoxicillin/clavulanic acid (1.2 g/8 h), being released with oral suspension of amoxicillin/clavulanic acid (9ml/8 h at 100 mg /12.5 mg/ml) with good evolution after follow-up by his physician.

Infections from animal bites in humans are usually polymicrobial, with a mixture of aerobic and anaerobic microorganisms that reflect the oral flora of the animal that produces the lesion [2,3]. Besides bites and scratches, contact with colonised or infected animal saliva is also a possible transmission

Correspondence:
Domingo Fernández Vecilla
Clinical Microbiology Service. Basurto University Hospital. OSI Bilbao-Basurto. 18 Avenida Montevideo avenue, 48013, Bilbao (Biscay). Spain.
E-mail: domingo.fernandezvecilla@osakidetza.eus

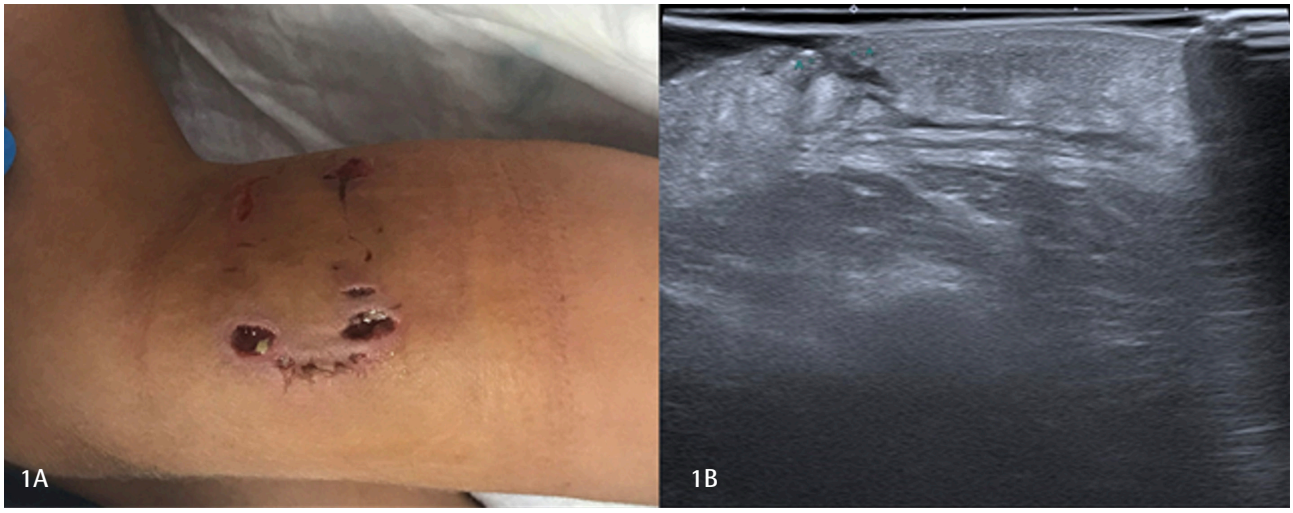

Figure 1 1A: four symmetrical wounds of around 1.5 cm with torn skin, regular borders, bloody and purulent secretion. In addition, the perilesional area presented redness, heat and swelling, which encompassed up to 7x5 cm.
1B: the thickening of the subcutaneous region associated with four skin wounds with subcutaneous trajectory in relation to the entrances of the bite. Mild laminar oedema in the deep subcutaneous region. There is no involvement of the muscle plane and no collections are observed.

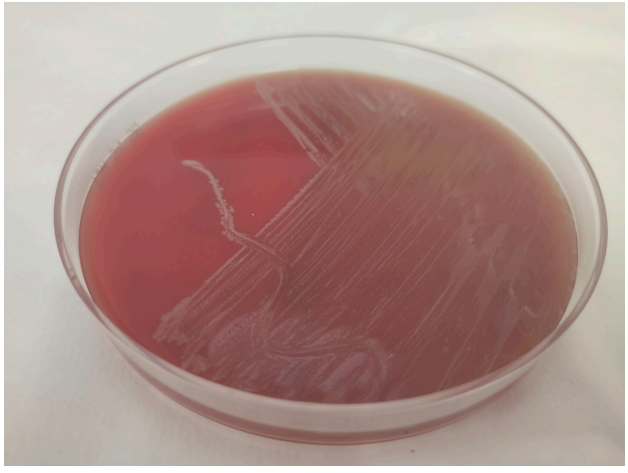

Figure 2 Growth of white colonies on TSA with 5% of sheep blood agar after 24 h of incubation under aerobic conditions with 7.5% of CO_2. The growth of *A. canis* on culture plates could not be shown since the image was not obtained during the episode and after trying to recover it from the bacterial library it was no longer viable for culture.

route, finding, for example, that multiple infections by *Pasteurella* spp. were not preceded by bites or scratches [4,5].

The most frequent infections produced by *Pasteurella* spp. are those of the skin and soft tissues, with the respiratory and invasive infections being rare, and with *Pasteurella multocida* being the most frequently isolated species [4-6]. The invasive infections such as sepsis, meningitis or peritonitis are usually produced more frequently in immunocompromised patients, with comorbidities or in patients in extreme age groups [3,6,7]. There are few reported cases up to now of human infections due to *P. stomatis,* while *A. canis* only seemed to produce infections in animals [5,8-10].

As for the handling of animal bites, the first is to clean the area with soap and water. The post-exposure antibiotic prophylaxis for the majority of the bites continues being controversial. The bites on the hand are the only location that seems to benefit from antibiotic prophylaxis and its use in these patients significantly decreases the infection rates [2,11]. In case of extreme pain, exposure of the muscle or underlying bone or signed of infection, if the state of vaccination against rabies of the dog is unknown or when the patient was vaccinated for the last time against tetanus, it is important to go to the healthcare centre or nearest hospital as soon as possible for its evaluation and treatment [12]. Amoxicillin/clavulanic acid and doxycycline or the combination of quinolones with clindamycin could be used as antibiotic prophylaxis. In case of abscess or other signs of complication of the wounded skin and soft issue infections, as well as in the case of invasive infections, cultures would be required to be able to establish an appropriate antibiotic treatment [11].

In conclusion, the cleaning and debridement of the wounds, as well as the identification of the patients who need antibiotic prophylaxis, against tetanus or rabies are keys for handling and to avoid serious complications. In those cases in which there is a suspicion or signs of infectious complication of the wounds, the patient should be examined again, microbiological samples obtained and an empirical antibiotic should be recommended until knowing the results. The virulence of the specie that inhabit the oral flora of the animals must continue to be researched to know which could provoke serious infections in humans.

FUNDING

The translation was financed by the research commission of the OSI Bilbao-Basurto.

CONFLICTS OF INTERESTS

Authors declare no conflicts of interest.

REFERENCES

1. Hoyles L, Falsen E, Foster G, Pascual C, Greko C, Collins MD. *Actinomyces canis* sp. nov., isolated from dogs. Int J Syst Evol Microbiol. 2000 Jul;50 Pt 4:1547-1551. doi: 10.1099/00207713-50-4-1547.
2. Abrahamian FM, Goldstein EJ. Microbiology of animal bite wound infections. Clin Microbiol Rev. 2011 Apr;24(2):231-46. doi: 10.1128/CMR.00041-10.
3. Girón FF, Martín JMS, Gómez ER, Muñoz SC, Carmelo FG, Gómez IG, Mora MTM, Escolano FJR, Chaparro CG. Simultaneous *Streptococcus canis* and *Pasteurella multocida* Peritonitis in a Peritoneal Dialysis Patient. Perit Dial Int. 2017 Jul-Aug;37(4):483-484. doi: 10.3747/pdi.2016.00286.
4. Kristinsson G. *Pasteurella multocida* infections. Pediatr Rev. 2007 Dec;28(12):472-3. doi: 10.1542/pir.28-12-472.
5. Holst E, Rollof J, Larsson L, Nielsen JP. Characterization and distribution of *Pasteurella* species recovered from infected humans. J Clin Microbiol. 1992 Nov;30(11):2984-7. doi: 10.1128/jcm.30.11.2984-2987.1992.
6. Weber DJ, Wolfson JS, Swartz MN, Hooper DC. Pasteurella multocida infections. Report of 34 cases and review of the literature. Medicine (Baltimore). 1984 May;63(3):133-54. PMID: 6371440.
7. Fernández Vecilla D, Unzaga Barañano MJ, Aspichueta C, Díaz de Tuesta JL. Shock séptico y empiema por *Pasteurella multocida* [Septic shock and empyema induced by Pasteurella multocida]. Rev Esp Quimioter. 2021 Oct;34(5):506-508. Spanish. doi: 10.37201/req/047.2021.
8. Pouëdras P, Donnio PY, Le Tulzo Y, Avril JL. *Pasteurella stomatis* infection following a dog bite. Eur J Clin Microbiol Infect Dis. 1993 Jan;12(1):65. doi: 10.1007/BF01997063.
9. Foguem C. Rare case of catastrophic diffuse hemorrhage complicating sepsis and meningitis due to *Pasteurella stomatis* in an elderly woman mimicking hemorrhagic septicemia. J Am Med Dir Assoc. 2014 Jul;15(7):527-528. doi: 10.1016/j.jamda.2014.04.008.
10. Knoepfler S, Schauer A, Thomann A, Feyer S, Rüegg-van den Broek P, Glardon OJ, Kittl S. Actinomycosis in a gray four-eyed opossum (Philander opossum) caused by a novel species of Schaalia. BMC Vet Res. 2021 Jul 13;17(1):243. doi: 10.1186/s12917-021-02937-3.
11. Hurt JB, Maday KR. Management and treatment of animal bites. JAAPA. 2018 Apr;31(4):27-31. doi: 10.1097/01.JAA.0000531049.59137.cd.
12. Desai AN. Dog Bites. JAMA. 2020 Jun 23;323(24):2535. doi: 10.1001/jama.2020.1993.