








## CASE REPORT

## *Pasteurella multocida* Submandibular Gland Abscess and Sepsis: Case Report and Literature Review

Antonio Mastroianni, MD<sup>1\*</sup> , Sonia Greco, MD<sup>1</sup> , Valeria Vangeli, MD<sup>1</sup> , Maria Vittoria Mauro, MD<sup>2</sup> , Daniela Perugini, MD<sup>2</sup>, Francesca Greco, MD<sup>2</sup> and Roberto Manfredi, MD<sup>3</sup> 

<sup>1</sup>Infectious & Tropical Diseases Unit, "Annunziata" Hub Hospital, Italy

<sup>2</sup>Microbiology & Virology Unit, "Annunziata" Hub Hospital, Italy

<sup>3</sup>Institute of Infectious Diseases, Alma Mater Studiorum University of Bologna, Italy



\*Corresponding author: Dr. Antonio Mastroianni, MD, Infectious & Tropical Diseases Unit, "Annunziata" Hub Hospital, Azienda Ospedaliera di Cosenza, Viale della Repubblica s.n.c., 87100 Cosenza, Italy, Tel: +39-0984-68.18.33; +39-349-54.44.330

### Abstract

*Pasteurella multocida*, a gram-negative coccobacillus, part of the normal oral flora of many domestic and wild mammals, has been described a widespread veterinary pathogen and has the potential to cause zoonotic infections in humans resulting from injuries caused by household or wild pets. Skin and soft tissue infections following a cat or dog bite are the more common manifestations of human infection. Salivary gland infections are somewhat common and viral infections, such as mumps, and bacterial infections may affect the submandibular glands. To our knowledge, this is the first reported case of submandibular gland abscess caused by *P. multocida* in a patient without pet contact.

### Keywords

*Pasteurella multocida*, Submandibular gland infection, Gram-negative sepsis

### Introduction

Submandibular gland infection is an uncommon but life-threatening disease. While the most common infectious causes are the typical respiratory pathogens, *Pasteurella multocida* is not previously reported as a causative organism. This case is unique in the fact that this occurred in a patient with no significant risk factors for exposure to these bacteria. Additionally, we report the first case, to our knowledge, of a submandibular gland infection and sepsis in an elderly patient caused by this pathogen. *Pasteurella* species (spp.) are non-motile,

facultative anaerobic, Gram-negative coccobacilli that belongs to the family *Pasteurellaceae* which also includes *Haemophilus*, *Actinobacillus*, *Mannheimia* and *Aggregatibacter*, among others. *P. multocida* is a gram-negative rod part of the commensal oropharyngeal microbiota of many household animals, and, usually, infections by *P. multocida* in humans is more common in the context of an animal bite leading to a skin and soft tissue infection (SSTI). We discuss a unique case of *P. multocida* severe sepsis starting from a submandibular gland abscess, with no documented history of an animal bite or close contact with domestic animals.

### Case Report

An 85-year-old female with prior surgery for breast-uterus cancers and an ischemic cardiomyopathy accessed our ward through the Emergency Room of our Hospital due to hyperpyrexia, vomiting and altered mentation. No contact with pets was reported. Clinical examination did not show focal neurological deficits, but attention was drawn on an enlarged-painful-tender right submandibular gland, accompanied by a significant regional lymph node swelling. Upon admission, laboratory examinations showed a moderate leukocytosis with neutrophilia (15,580/10,390 cells/ $\mu$ L respectively), and increased serum procalcitonin (11.11 ng/mL) and C-reactive protein (119 mg/L) 2 levels. An ultrasound and subsequent computed tomography (CT)

imaging of the neck were concerning for a heterogenous collection in the region of the right submandibular gland and a relevant swelling of satellite nodes. Given her clinical presentation, laboratory results, and imaging findings, she was diagnosed with right acute suppurative submandibular abscess and adenitis. At 24 h there was growth in chocolate agar and TSA with 5% of sheep blood, being identified through MALDI-TOF mass spectrometry (Bruker, Massachusetts, USA) as *P. multocida*. The antibiotic susceptibility was performed through gradient strips or E-test® in Mueller-Hinton fastidious agar (BD®). *P. multocida* was susceptible to penicillin (MIC = 0.38 mg/L), amikacin (MIC 8), amoxicillin/clavulanic acid (MIC ≤ 2), ampicillin (MIC ≤ 2), cefepime (MIC ≤ 1), cefotaxime (MIC ≤ 1), ceftazidime (MIC 2), ciprofloxacin (MIC ≤ 0.25), imipenem (MIC ≤ 0.25), meropenem (MIC ≤ 0.25), piperacillin/tazobactam (MIC ≤ 4), while gentamicin (MIC 4) showed an intermediate susceptibility. Findings of salivary gland fine needle aspiration (FNA) cultures provided a yield of *P. multocida* colonies. A viral respiratory multi-panel from the nasopharynx and extensive serologic and molecular pathologic workup serologies resulted negative. Chest X-ray and abdominal ultrasonography failed to point out relevant issues. She was transitioned to an intravenous treatment with full-dose ceftriaxone and ciprofloxacin, to complete a 2-week course of antibiotics. After ENT-dentistry consultations which excluded complications requiring surgical drainage, sequential oral therapy was continued with ciprofloxacin until discharge. The follow-up continued on an outpatient basis every 2 other weeks for 2 months [1].

## Discussion

The submandibular gland is the second largest of the salivary glands; it is located at the angle of the mandible and the submandibular and sublingual spaces. The submandibular duct rises up from the anterior border of the submandibular gland and goes through the sublingual space between the mylohyoid muscle/sublingual gland and the hyoglossus/genioglossus muscles [2]. Infections within the submandibular space can cause significant mortality and morbidity. In immunocompromised patients and with comorbidities, especially diabetes mellitus, it is indicated to maintain a high level of suspicion for potential life-threatening complications. Predisposing conditions include odontogenic infection, poor dental hygiene or stones in these glands and a blocked duct, intubation, use of anticholinergic agents, elderly people, a dry mouth due to medications, dehydration, or surgery, improper nutrition, tooth extractions and recent trauma. An infection in these glands can make the glands swell and hurt. The management of deep neck infections remains particularly troublesome due to the complex anatomy of the neck and leads to life-threatening complications that may arise. The most common pathogens associated with acute bacterial infection are *Staphylococcus*

*aureus* and anaerobic bacteria. The predominant anaerobes include: anaerobic Gram negative bacilli (eg, *Bacteroides* predominates among with pigmented *Prevotella* and *Porphyromonas*); *Fusobacterium* spp; and *Peptostreptococcus* spp. In addition, *Streptococcus* spp (including *Streptococcus pneumoniae*) and aerobic and facultative Gram-negative bacilli (including *Escherichia coli* and *Klebsiella* spp.) have been reported. Aerobic and facultative Gram-negative bacilli are often seen in hospitalized patients [3]. Our patient was an elderly female with different significant co-morbidities that would suggest immunosuppression, however, although she did haven't recent exposure to animals and didn't report living with pets, it cannot be excluded she was a respiratory carrier of *Pasteurella* after previous animal contact. Bacterial organisms from the *Pasteurella* spp. live in the mouths of most cats, as well as in the upper respiratory tract of healthy livestock and domestic animal species. *P. multocida* is a zoonotic pathogen, responsible for significant morbidity and mortality in both humans and animals. Human infections are usually contracted following exposure to domestic pets such as cats and dogs transmitted by bites, scratches or licks. The most common manifestation of humans infections is a local wound infection that can develop into a serious soft tissue infection, usually following dog or cat bites or scratches, and can also be complicated by abscesses, septic arthritis and osteomyelitis. The respiratory tract is the second most common site of *P. multocida* infections that can also cause meningitis, endocarditis, and ocular infections, usually in patients with underlying pulmonary disease, in the elderly, in the immunocompromised, and in neonates. *P. multocida* infections are almost universally penicillin-sensitive, making this the first-line treatment. Alternative therapy may include 2<sup>nd</sup> and 3<sup>rd</sup> generation cephalosporins, fluoroquinolones. The only reported cases of *P. multocida* involving the ear, nose, and throat (ENT)-dentistry district include reports of acute epiglottitis [4,5], whereas to the best of our knowledge no cases of salivary glands involvement by *P. multocida* have been described until now. Although being an infrequent occurrence, clinicians should be aware of the potentially severe behavior of *P. multocida*, even in the absence of a recent history of animal contacts.

## Author Contributions

All the authors contributed to the clinical evaluation of the cases and to the drafting of the manuscript.

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## Funding, Conflicts of Interest

None.

## Patient's Consent

Written informed consent was obtained from the patient for publication of this case report.

## References

1. Hasan J, Hug M (2022) *Pasteurella Multocida*. In: StatPearls [Internet], Treasure Island (FL): StatPearls Publishing.
2. Vu M, Lopez Ortiz C, Sosa M, Peplinski B, Ganti L (2022) Acute submandibular sialadenitis. *Cureus* 14: e24435.
3. Maharaj SH (2019) A review of the microbiology of submandibular space infections. *J Maxillofac Oral Surg* 18: 584-588.
4. Jan L, Boute P, Mouawad F (2021) *Pasteurella multocida* acute epiglottitis. *Eur Ann Otorhinolaryngol Head Neck Dis* 138: 100-102.
5. Moyko A, Ali NJ, Dubosh NM, Wong ML (2017) *Pasteurella multocida* epiglottitis. *Clin Pract Cases Emerg Med* 1: 22-24.