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# Septic arthritis of the ankle: Do not forget *Pasteurella pneumotropica*

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ABSTRACT

*Pasteurella pneumotropica* is an important bacterial pathogen in both animals and humans. Most reported Pasteurella infections in humans involve skin and soft tissues, often after an animal bite, scratch, or lick to an open wound. We report a case of septic arthritis with *Pasteurella pneumotropica* in a diabetic and cardiopathic patient who was the victim of a rat bite in the street, with a good evolution after medical and surgical treatment.



## Background

*Pasteurella pneumotropica* is a urease-positive, nonmotile, gram-negative pleomorphic organism. This organism is a rodent and small animal pathogen that was first described by Jawetz in 1948 [1]. Rarely do cases of human infection with *P. pneumotropica* occur, but most of those reported have been in the context of an animal wound or exposure to the oral flora of small mammals. Pasteurella species, including *P. multocida*, which is frequently associated with human disease, and *P. pneumotropica*, occur as indigenous organisms in the oral, respiratory, and gastrointestinal tissues of wild, domestic, and laboratory animals.

*Pasteurella pneumotropica* has only rarely been isolated from humans, with few cases of human infection recorded [2]. In a MEDLINE search of the world literature, 12 reported cases were reported between 1969 and 2001. Most humans infected with *P. pneumotropica* received an animal wound to the skin. Although infections involving *P. pneumtropica* with no known source of acquisition have rarely been reported, the same is not true for *P. multocida*, which has been noted to occur independent of an animal wound. Given the rarity and garavity of this bacterium in human pathology [3]. We report a case of septic arthritis with *pasteurella pneumotropica* in a diabetic and cardiopathic patient who was the victim of a rat bite in the street.

## Case report

This is a 68-year-old patient known to be diabetic with ischemic heart disease undergoing treatment for septic arthritis of the left ankle. Symptoms began 15 days previously with fever (39–40 °C) and inflammatory arthralgia of the ankle and knee following a rat bite. Three days later, a non-pruritic, erythematous papulopustular rash occurred on the dorsal surface of the midfoot, extending to the ankle and distal leg. Two weeks after the onset of symptoms, while fever and arthralgia persisted, an active fistula in the tarsal scaphoid appeared, which motivated the patient's consultation in our département.

Clinical examination revealed a fever at 39.7 °C, a slightly indurated red lump on the dorsal surface of the left foot with scratches, an active fistula, and edema of the left lower limb. The rest of the clinical examination was normal. Standard radiography of the left ankle did not reveal signs of osteitis (Fig. 1). Ultrasonography of the left ankle showed infiltration and thickening of the soft tissue around the left ankle with individualization of a deep, poorly limited collection suggestive of an abcessed collection. Blood tests showed hyperleukocytosis at 14,000 and CRP at 63 mg/l.

The patient benefited from surgical incision and drainage of the abscess. The drainage liquid benefited from a cytological study revealing a predominance of neutrophilic polynuclear cells and a culture on agar media agarred with 5 % horse blood and cooked blood and incubated at 37 °C in an atmosphere enriched with 5–10

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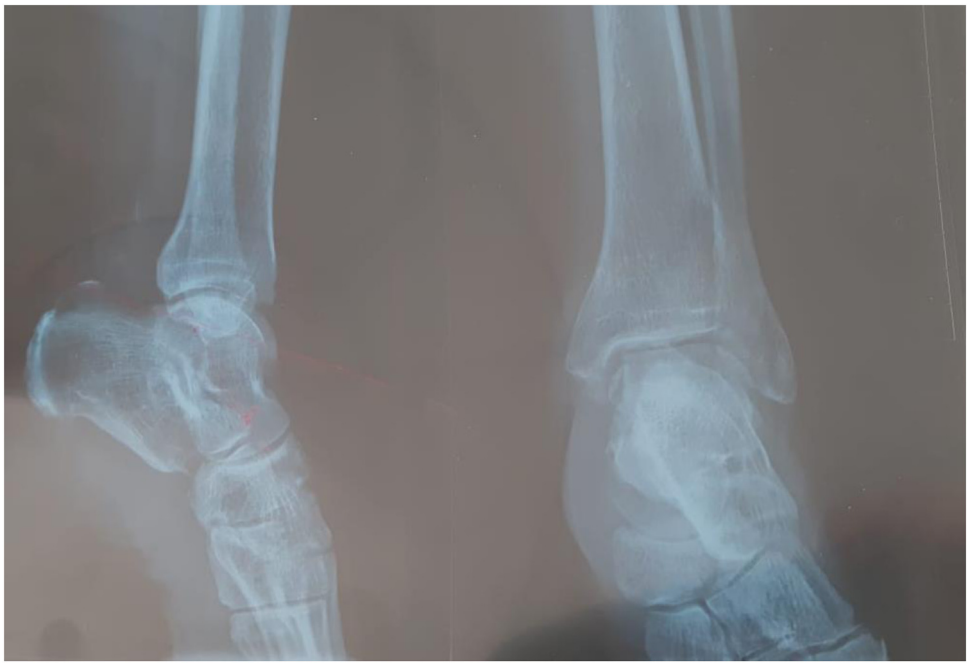

**Fig. 1.** Radiograph of the left ankle abscessed.

% CO2 and also on anaerobic media, incubated at 37 °C in an anaerobic jar. After 24 h of incubation, the culture allowed the isolation of small colonies with regular non-hemolytic edges. Direct examination after Gram staining showed Gram-negative coccobacilli. Biochemical characteristics such as oxidase, urea, indole, glucose and sucrose were positive. An API 20NE® gallery (Bio- Mérieux, Marcy l'étoile France) allowed the identification of 96.9 % *Pasteurella pneumotrpica* with excellent identification (code 3200004). Similarly, cytobacteriological examination of the drainage liquid after enrichment, allowed the isolation and identification of the same bacterium under the same conditions as above. The antibiogram was carried out by diffusion method in Mueller-Hinton agar medium containing 5 % horse blood in compliance with the recommendations of EUCAST 2020. The study of antibiotic sensitivity showed that this strain was resistant to ampicillin, nalidixic acid and tetracycline, sensitive to amoxicillin-clavulanic acid, cefotaxime, sulfamethoxazole-trimethoprim.

The minimal inhibitory concentrations study of amoxicillin-clavulanic acid, ciprofloxacin and levofloxacin by E-test was 0.38-0.50 mg /l, 0.094 g/l and 0.125 mg/l, respectively.

The patient was given amoxicillin-clavulmanic acid and Ciprofloxacin intravenously for 10 days. After 48 h of treatment, there was good clinical and biological improvement.

## Discussion

*Pasteurella pneumotropica* was first described and named by Jawetz in 1948 and later described and studied by Jawetz and Baker in 1950 [1]. The described organism caused a necrotizing pneumonia in laboratory mice, and its apparent predilection for the lung led Jawetz to name the newly identified Pasteurella species *P. pneumotropica.*

*Pasteurella pneumotropica* is considered a pathogen with well-defined characteristics. Morphologically, the organism is a short, pleomorphic, nonmotile gram-negative rod or coccobacillus [4]. *Pasteurella pneumotropic*a is differentiated from other Pasteurella species based on its ability to produce urease and its glucose oxidation profile [5]. Like *P. multocida, P. pneumotropica* produces acid from sucrose and galactose but differs from *P. multocida* because it does not form acid from mannitol or sorbitol [6]. The nonhemolytic organism grows well on blood agar, revealing smooth, convex, gray to yellow colonies [2].

*Pasteurella pneumotropica* is one of the most frequently occurring opportunistic pathogens in rodents [7] and is noted to colonize the mucosa of the nasopharynx, trachea, lungs, vagina, urinary bladder, and intestines [8]. Although human disease is rare, *P. pneumotropica* has been the causative agent in cases of pneumonia, conjunctivitis, metritis, cystitis, peritoneal abscess, and dermatitis in laboratory and wild rodents. Cases of otitis, renal abscess, septicemia, and peritonitis in dogs have also been recorded [9]. Recent identification of *P. pneumotropica* as the most common gram-negative bacteria occurring in Ixodes ricinus implicates this tick as a harbinger of the bacteria and a potential vector to animal and human disease [10]. Human infection with *P. pneumotropica* has been documented rarely since its identification in 1948 [3]. Of the 12 cases found in a MEDLINE search, only 3 were reported from NorthAmerica,with the remaining majority found in Spain, France, and the United Kingdom. Historically, the most common presentation occurs after an animal wound. Household pets including dogs,cats, and hamsters have all been implicated in transmitting the offending organism to their human companions. Reported cases of human infections after a bite or scratch from a pet include endocarditis, meningitis [11], cellulitis [12], osteomyelitis [13], septicemia [14], pneumonia [5], and peritonitis [4]. A study on the transmissibility of *P. pneumotropica* suggests that transmission of the bacteria occurring through contaminated material is not likely and that the viability of the organism is dependent on the presence of moisture [6], which may explain why so few cases outside of animal wounds have been reported.

Our case reports septic arthritis with *Pasteurella pneumotropica* in a rat bite patient. A similar case previously recorded described an infection with *P. pneumotropica* causing osteomyelitis to the heel after a deep laceration from a jagged rock while the patient was walking in a creek bed [13]. Another case described an infection with *P. pneumotropica* causing cellulitis with no known exposure to small animal oral flora, via bites or scratches [3]. The patient's history included cardiac disease and diabetes, which are factors that may predispose an individual to infection. Another

factor that may contribute to the transmission of *P. pneumotropica* is a person's immune status [3]. A case reported in 1995, suggested that pneumonia caused by *P. pneumotropica* was contracted by a patient with acquired immunodeficiency syndrome.

Our case occurred in an immunocompromised patient, which is consistent with the literature. Two other human infections occurring in an immunocompromised host have been reported; a case of septicemia in a patient receiving chemotherapy for myeloid leukemia [8] and peritonitis in a patient undergoing dialysis after a hamster contaminated the dialysis tubing [2]. Diseases that lead to an immunocompromised host include alcoholism, cirrhosis, neoplasm, diabetes, patients who received an organ transplant or are asplenic, infected with human immunodeficiency virus, receiving high-dose steroids, or those with kidney failure [3].

Our patient was put on Amoxicillin-clavulanic acid and Ciprofloxacin bi-antibiotic therapy intravenously with good progression. The antibiotic of choice for Pasteurella infections is penicillin. In our case, *Pasteurella pneumotropica* was resistant to penicillin which led us to study the minimal inhibitory concentrations of Amoxicillin-clavulanic acid and ciprofloxacin for a better management.

## Conclusion

Faced with the increase of this opportunistic pathogen in human pathology, we insist that any skin wound that does not respond to empirical treatment must be subjected to bacteriological study with the isolation of the causative agent and study of its sensitivity to antibiotics in order to find the appropriate treatment and also to reduce the development of multidrugresistance.

## Author contributions

BE, JY have been involved in drafting in the manuscript, YB, MA ha revising the manuscript, JY have participated to surgical care, follow up and given imaging reading, and ELM have given final approval of the version to be published.

## Declaration of Competing Interest

The authors declare no competing interest.

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