



Case report

Serious phlegmonous lesion of the hand following an injury by vegetal thorn: Never forget *Pasteurella multocida*!

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ABSTRACT

Pasteurella multocida can cause serious infections after dog or cat bite. We report here a rare case of hand infection caused by *P. multocida* consecutive to an injury by a thorn of the prickly pear. It caused an amputation of the distal phalanx of the thumb in a trisomic patient.

It is about a 27-year-old man who was admitted to the hospital with swelling and intense pain of the left hand. He reported a sting by a thorn of prickly pear 15 days before. The patient was admitted to proceed with operative irrigation and debridement. The pus was collected for microbiological examination. Microscopic examination after Gram staining revealed small Gram-negative coccobacilli, associated to polymorphonuclear reaction. Culture have objectivated *Pasteurella multocida*. The isolated strain was susceptible to betalactamins. Patient was treated with ampicillin. Well-conducted antibiotics and repetitive local cares have not prevented local lesions from progressing to necrosis of the soft parts of the thumb and osteitis of the distal phalanx of the thumb. The patient underwent a necrosectomy and an amputation of the distal phalanx. Ampicillin was replaced by amoxicillin/clavulanic acid and after 15 days, progression was clinically and microbiologically favorable.

In the case we report, since the patient does not report any exposure or contact with animals, the thorn prick is the source of infection. It was contaminated from the animal reservoir. Taking into account the monomicrobism of the infection, treatment with aminopenicillins was sufficient. Our propositus came to the hospital 15 days after the inoculation of the bacterium. This duration appears to be very late in relation to the acute character of pasteurellosis. This was probably the main reason why the local infection evolved towards osteoarticular complications. That's why, we should consider *Pasteurella multocida* in case of infection by inoculation, even in the absence of contact with the animals.

Introduction

Pasteurella is a genus of small bacteria in the form of gram-negative coccobacilli. Species of this genus are primarily commensal or pathogens of animals. In humans, they are known for their ability to cause zoonotic infections [1]. Skin and soft tissues are the most

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Fig. 1. Palmar face (A) and dorsal face (B) of the left hand with bubbles of purulent and hemorrhagic contents.

common sites for *Pasteurella* infections and, less commonly, the respiratory tract [2]. Most of these infections are caused by dog or cat bite, although lick and scratches from these animals have also been described [3]. The frequency of inoculation pasteurellosis is between 15 and 60 per million inhabitants per year. They progress in 88% of cases without complication, and with complication in 12% of cases. These complications are mainly osteoarticular damage [4]. We report here a rare case of hand infection caused by *P. multocida* consecutive to an injury by a thorn of the prickly pear. It caused an amputation of the distal phalanx of the thumb in a trisomic patient.

Case report

It is about a 27-year-old man who was admitted to the hospital with swelling and intense pain of the left hand. The patient reported a sting by a thorn of prickly pear 15 days before his admission to hospital. Except trisomy 21 and diabetes, he had no significant surgical or family history. Physical examination finds a conscious, stable patient on the respiratory and hemodynamic level with an erythematous and edematous hand, as well as bubbles of purulent and hemorrhagic contents (Fig. 1). In addition, there was also a finger flossum at the same hand. The initial laboratory findings were normal, except an elevated C-reactive protein: 93 mg/L (normal, 0–5 mg/L). Radiography of the hand was normal. Therefore, the patient was immediately admitted to proceed with operative irrigation and debridement. A double incision was made through the palmar face and the dorsal face of the first metacarpian. The pus was collected for microbiological examination. After that, a thorough debridement coupled with irrigation was performed and the wound was closed. Pending the results of the laboratory of microbiology, a probabilistic antibiotherapy based on ampicillin was administered by venous route (1 g three times a day for five days).

In the microbiology laboratory (Day 0), the specimen was examined as a deep pus. Microscopic examination after Gram staining revealed the presence of very many small Gram-negative coccobacilli, associated to a very strong reaction to polymorphonuclear neutrophils. Culture was carried out on blood agar (one plate incubated in aerobiosis and another in anaerobiosis), chocolate agar with vitamins (incubated in an atmosphere enriched with CO₂) and on broths vials (BD BACTEC™ Plus Aerobic/F and BD BACTEC™ Plus Anaerobic/F). After 4 h of incubation (Day 0), the BACTEC™ FX 400 automaton reported the positivity of both culture vials (aerobiosis and anaerobiosis). Microscopic examination after Gram staining revealed the exclusive presence of small Gram-negative coccobacilli, identical to those observed in the direct examination of the pus. Primocultures (incubated in aerobiosis, anaerobiosis and CO₂) and subcultures of broths on blood agar (incubated in aerobiosis and anaerobiosis) gave the same colonies appearance after 48 h of incubation (day 2). Macroscopically, the colonies were grayish and had 3 mm in diameter. Microscopically, the bacteria had morphology and staining properties similar to those described previously. The search for oxidase was positive for these facultative aerobic-anaerobic bacteria. Complete biochemical identification by BD Phoenix™ NID Panel objectivated *Pasteurella multocida* for 99.99% of confidence (day 3). The antibiotic susceptibility testing was conducted in accordance with the recommendations of the European Committee on Antimicrobial Susceptibility Testing (EUCAST) [5]. The isolated strain was susceptible to penicillin G, ampicillin, amoxicillin, amoxicillin/clavulanic acid and cotrimoxazole. It was resistant to nalidixic acid, ciprofloxacin, levofloxacin, tetracyclin and doxycyclin (day 4).

Well-conducted antibiotics and repetitive local cares have not prevented local lesions from progressing to necrosis of the soft parts of the thumb and osteitis of the distal phalanx of the thumb. The patient underwent a necrosectomy and an amputation of the distal phalanx of the thumb (Figs. 2 and 3). After five days (day 6) of antibiotherapy with ampicillin, this one was replaced by amoxicillin/clavulanic acid (1 g, three times a day for 15 days). After this (day 20), progression was clinically and microbiologically favorable.



Fig. 2. Palmar face of the left hand after amputation of the distal phalanx of the thumb.



Fig. 3. Radiograph of the left hand after amputation of the distal phalanx of the thumb.

Discussion

Species of the genus *Pasteurella* are nonmotile, facultatively aero-anaerobic, Gram-negative coccobacilli measuring 1 to 2 μm in length. They are able to grow on common culture media, but their isolation is facilitated by the use of enriched culture media [1,6]. *P. multocida* belongs to the oropharyngeal and gastrointestinal commensal flora in a wide range of terrestrial and aquatic vertebrates. Furthermore it has been demonstrated that *P. multocida* can survive for a long time in organic materials (such as thorns in the case we report) and up to 1 year in water or in free-living amoeba representing additional probable reservoirs in the soil and water ecosystems [7]. Broadly speaking, human pasteurellosis can be divided into two types: infection occurring after animal bites, usually from dogs or cats, and infection with no known animal contact [8–10]. The inoculation could be also indirect, following a spike by plant spine, splinter of wood or wire contaminated from the animal reservoir [11]. In our patient, the thorn prick is the source of infection, since the patient does not report any exposure or contact with animals. The most common type of infection by *P. multocida* is cellulitis, which is usually characterized by the rapid development of an intense inflammatory response [12]. Pain and swelling are usually prominent, and purulent discharge is noted in about half of patients, most of them develop symptoms within 24 h of the initial injury [13]. Penicillin is the treatment of choice for *Pasteurella* infections. Other agents with good activity include ampicillin, amoxicillin–clavulanate, cefuroxime and ciprofloxacin [14]. In the case we report, taking into account the monomicrobism of the infection, treatment with aminopenicillins was sufficient. Broad-spectrum antibiotics are usually recommended for infected animal bites, which are often polymicrobial [14]. In the case we report, the broadening of the spectrum of antibiotic therapy by using amoxicillin/

clavulanic acid, was mainly intended for prophylaxis of surinfection of the surgical site after amputation, while maintaining activity against *P. multocida*. Our propositus came to the hospital 15 days after the inoculation of the bacterium. This duration appears to be very late in relation to the acute character of pasteurellosis. Thus, *P. multocida* took sufficient time to express its known virulence factors such as invasion of the tissues by production of various enzymes, [4]. This was probably the main reason why the local infection evolved towards osteoarticular complications responsible for the damage we have described. The other reasons would be related to the patient himself. Indeed, diabetes and the localization of the lesion (hand) are two factors that justify the use of prophylactic antibiotics after cats or dogs bites, to prevent the dramatic evolution of pasteurellosis [14].

Conclusion

Pasteurella multocida can cause serious infections. The case we report shows that we should consider it in case of infection by inoculation, even in the absence of contact with the animals. Thus, pasteurellosis should constitute a differential diagnosis to the same degree as tetanus. In the absence of vaccination, this suspicion should allow rapid diagnosis and treatment, in order to avoid complications.

Authorship

All authors have made substantial contributions to all of the following:

- The conception and design of the study, acquisition of data, analysis and interpretation of data.
- Drafting the article and revising it critically for important intellectual content.
- Final approval of the version to be submitted.

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Conflict of interest

None

Ethical considerations

None

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