

Bacteremic meningitis due to *Pasteurella multocida* resistant to first line antibiotic therapy

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Abstract

Pasteurella species reside in the gastrointestinal tract of many animals, especially in pets such as cats or dogs. Zoonotic transmission of *Pasteurella* to human is documented. We describe a case of meningitis in a 66-year-old woman with positive blood culture for *Pasteurella multocida*. Meningitis caused by zoonosis agents is a rare event, but it should be suspected in patients that have recreational or professional exposure to animals. In this case, not only the etiologic agent was rare, but the microorganism was also resistant to first-line antibiotic drugs.

Introduction

Pasteurella species are facultative anaerobic gram-negative coccobacilli, normally found in the oral cavity and upper respiratory tract of the animal population.¹ Transmission to humans is possible through animal bites, wounds or inhalation route.

Pasteurella multocida is the species most frequently involved in human infections.² The principal clinical manifestation of pasteurellosis is represented by local skin infections following animal bites or scratches, but it is also possible to observe pneumonia, bacteremia, osteomyelitis, endocarditis and meningitis.¹

During the last 65 years, approximately 100 cases of *Pasteurella multocida* meningitis were reported, especially in a pediatric setting.

Hereby we describe a case of an unusu-

al and severe clinical manifestation of *Pasteurella multocida* infection with documented resistance to first-line therapy.

Case Report

We describe a case of a 66-year-old woman admitted to the Infectious Disease ward of the G. Martino University Hospital, in Messina (Italy), for fever arisen 24 hours before, with nuchal rigor, mental confusion and right earache.

Laboratory investigation revealed an increase of C Reactive Protein (CRP) (8.70 mg/dL; normal <0.50 mg/dL) and neutrophilic leukocytosis. A head computerized tomography (CT) scan highlighted mastoiditis and otitis with pathological tissue around the right ossicular chain. In the suspicion of meningitis, we performed blood cultures and tried to execute a lumbar puncture. The attempt was not successful due to the obese habitus of the patient.

We then started a therapy with corticosteroids (dexamethasone 0.15 mg/kg q 6h for three days) and an empiric antibiotic treatment with ceftriaxone 2 g bid and ampicillin/sulbactam 2/1 g qid. On the 4th day of the admission, blood culture resulted positive for *Pasteurella multocida* (identified with Vitek 2.0, then confirmed with Maldi Tof), resistant to ampicillin and cephalosporins (Table 1). On the other hand, it was susceptible to rifampin, levofloxacin and trimethoprim/sulfamethoxazole (TMP/SMX); therefore, we changed the antibiotic therapy, stopping ampicillin/sulbactam and ceftriaxone and starting rifampin 600 mg qd, levofloxacin 750 mg qd and 1280/6400 mg of intravenous TPM/SMX divided in four doses. During her staying in our ward, the patient's conditions gradually improved, and we discharged her on the 12th day after admission in good clinical conditions.

Only after the isolation of *Pasteurella multocida* in blood cultures, when the patient was in better health and able to report about her risk factors, she told us she was used to feed many stray cats living near her home.

Informed consent

The patient signed a standard form of consent, expressing her informed consent for the scientific use of her clinical data.

Discussion

The principal clinical manifestation of pasteurellosis is represented by local skin

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infections following animal bites or scratches.

We report a case of meningitis caused by *Pasteurella multocida* in an immunocompetent patient. Although meningitis is an uncommon outcome of a *P. multocida* infection, it has been reported in the past, especially in a pediatric population, making this micro-organism a rare cause of adult bacterial meningitis.^{1,3} Furthermore, studies have shown a mortality ranging from 7 to 31% in patients with *Pasteurella* bacteremia.⁴

The source of infection in our patient was probably represented by the stray cats she fed, but she could not remember any scratch or bite. Literature reports that the main risk factor for *Pasteurella multocida* meningitis is represented by contact with animals, which is suggested as a source of infection in 84% of cases.⁵ Transmission can also occur through contact with the animal's saliva.⁶ Another risk factor is an age over 55 years old.⁵ Our patient was a 66-year-old woman and a cat-owner; thus, she was at high-risk for this form of meningitis.

Table 1. Blood culture results and susceptibility testing for *Pasteurella multocida*. Result: positive. Micro-organism: *Pasteurella multocida*.

Antibiotic	Sensitive (S), Intermediate (I), Resistant (R)
Amikacin	S
Ampicillin	R
Cefepime	R
Cefotaxime	R
Ceftazidime	R
Ciprofloxacin	S
Gentamicin	S
Imipenem	R
Meropenem	R
Nitrofurantoin	S
Tigecycline	S
Doxycycline	S
Tetracycline	S
Ofloxacin	S
Rifampin	S
Piperacillin	S

This case is also interesting because *P. multocida* is typically susceptible to penicillin and cephalosporins.⁷ These drugs are indicated in the treatment of the most frequent form of infection due to *P. multocida*: skin infections following bites or scratches.⁸ Rare penicillin-resistant *P. multocida* strains in human infections have been described and, in these cases, second- and third-generation cephalosporins are recommended for treatment.^{9,10} However, despite resistance to cephalosporins has only been reported in oral first generation antimicrobials belonging to this class, in our case these drugs were ineffective too, thus it was necessary to choose a different therapeutic regimen based on the micro-organism reported susceptibilities to rifampin, TPM/SMX and fluoroquinolones.¹¹

Conclusions

Pasteurella multocida is a rare cause of meningitis. Clinical signs are those typical of meningitis and not specific. Rare etiologies should be considered when choosing the empiric therapy. A positive anamnesis for animal contact can be helpful to reach the diagnosis. Moreover, it is mandatory to consider the ever more recurring resistance to first line antibiotic therapy.

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