

Pasturella Multocida Infections

Henry Debrah, BS, MT (ASCP)
Oceania University of Medicine, First-Year Medical Student

Background

This report is a case of a cat bite wound of a 63-year-old female patient. The identity of the strain isolated in the patient's wound culture was proved by the microscan bacteria identification system. *P. multocida* is a small, gram-negative, non-motile, non-spore-forming coccobacillus with bipolar staining features. *P. multocida* is a commensal organism in most livestock, poultry, and domestic pet species cats and dogs. It is often transmitted through bites and scratches from pets and it can be found in mammals and fowl. Steps to Implementing an obesity prevention and treatment program for children in Samoa. This will be based on proposing various guidelines to target obese infants and children.

Introduction

Infections due to *P. multocida* are frequently diagnosed in humans.² Two to 4.5 million animal bites occur each year in the United States; about 1% of these bites require hospitalization. Dog and cat bites account for approximately 1% of all emergency room visits annually in the United States.¹³ Colonies are 1-2mm in diameter after 24 hours of growth on blood agar at 37° C. Patients who have *Pasteurella* inoculated via a bite wound develop rapid onset of pain, erythema and edema locally. Infections without epidemiologic evidence of animal contact may occur. On the other hand, it is useful to consider what other medical conditions might be possible misdiagnoses or other alternative conditions relevant to diagnosis. The clinical history, patient presentation and culture results of this case report are consistent with the diagnosis of *P. multocida* infection. Usually, infections with *P. multocida* follow one of three clinical patterns; adenitis, pulmonary and systemic infections.

Case Report

A 63-year-old female presented in the Bon Secours Hospital Emergency Room with an animal bite wound, showing two punctured bite marks on the Right Hand. Patient had erythema, warmth and pain, joint swelling and decreased range of motion. Intravenous antibiotics were administered and patient showed signs of improvement. The lab results were obtained: Neutrophils 58%, Glucose 152mg/dl, WBC 7.2k/ul, RBC 3.67 M/ul, MCV 100.5 FL, MCH 34.3 PG, MPV 11.3 FL, Monocytes 0.9 k/ul. The gram stained smear from bite wound showed a few polymorphonuclear leukocytes present but no organisms were seen on the gram stain. Blood cultures had No growth after 3 days. However the wound culture grew rare gram-negative coccobacillus after 48 hours of incubation at 37°C on Blood agar. The organism was later identified on the microscan identification system as *P. multocida*. The patient was treated with a course of augmentin and ciprofloxacin.

Discussion

First, adenitis usually results from cat bites due to inoculation of the organism deep into the periosteum by the long sharp teeth.¹ A progression to osteomyelitis of underlying bones is not ruled out. These types of infections are also characterized by an elevation in WBC with a left shift.

A second pathway is chronic pulmonary infections which usually occur in association with other organisms. In some instances, *P. multocida* can become part of the normal flora of the human respiratory tract. Veterinarian students and animal handlers have been found to carry *P. multocida* organism without exhibiting any pulmonary symptoms.³ In a study by Jacques et al., capsulated and noncapsulated organisms were found to have a difference in virulence. Mice and piglets inoculated with capsulated organisms had more severe turbinate infections.⁵ The capsulated organisms have a cell surface lipopolysaccharide, which plays a role in virulence.¹⁰ Non-capsulated organisms likely had more exposure of surface adhesions, which promoted respiratory tract colonization.⁷ The third group of infections is systemic with meningitis or pneumonia.¹

Systemic infection due to *P. multocida* is uncommon in healthy people. Patients who are immunocompromised can develop infections after casual animal contact including bacteremia, meningitis, brain abscess, spontaneous bacterial peritonitis, intra-abdominal abscesses. In a review of patients having positive cultures of *P. multocida* at a university hospital in Crete, Greece, Christidou et al noted that the majority of their patients were over 70 years of age. Patients have a variety of underlying diseases such as diabetes, malignancies, rheumatoid arthritis, liver dysfunction, chronic pulmonary diseases and systemic lupus erythematosus.⁴ Duggal et al reported a case of a splenectomized patient who had developed septicemia after exposure from a pet rabbit.¹¹

Pasteurella strains, though gram-negative, are responsive to ampicillin, penicillin, second and third generation cephalosporins, doxycycline, trimethoprim-sulfamethoxazole, fluoroquinolones, azithromycin, and clarithromycin. First generation cephalosporins, clindamycin, and erythromycin have less activity against *Pasteurella multocida*.^{4,11} It is important to request beta-lactamase testing from the microbiology lab if penicillin is to be used for treatment. Beta lactamase production has been found on testing, therefore beta-lactamase inhibitor should be added for empirical therapy. Wound infections associated with animal bites usually have a polymicrobial etiology, mandating the empiric use of broad-spectrum antimicrobials targeted at both aerobic and anaerobic gram-negative bacteria. These wounds can exhibit a rapidly progressive soft-tissue inflammation that may resemble group A β -hemolytic *Streptococcus pyogenes* infections.¹

References

1. Morton NS, Lawrence JK. 1959. *Pasteurella multocida* Infections in Man — Report of Two Cases — Meningitis and Infected Cat Bite NEJM 261:889-893.
2. Alexandre L, Burke AC. 2012. *Pasteurella multocida* Infection
3. Chen HI, Hulten K, Clarridge JE 3rd. Taxonomic subgroups of *Pasteurella multocida* correlates with clinical presentation. J Clin Microbiol. 2002 Sep; 40(9):3438-41. PubMed PMID: 12202590; PubMed Central PMCID: PMC130671.

4. Sanchez S, Mizan S, Quist C, Schroder P, Juneau M, Dawe D, Ritchie B, Lee MD. Serological response to *Pasteurella multocida* NanH sialidase in persistently colonized rabbits. *Clin Diagn Lab Immunol*. 2004 Sep; 11(5):825-34. PubMed PMID: 15358639; PubMed Central PMCID: PMC515265.
5. Jacques M, Kobisch M, Bélanger M, Dugal F. Virulence of capsulated and noncapsulated isolates of *Pasteurella multocida* and their adherence to porcine respiratory tract cells and mucus. *Infect Immun*. 1993 Nov; 61(11):4785-92. PubMed PMID: 8406879; PubMed Central PMCID: PMC281235.
6. St Michael F, Vinogradov E, Li J, Cox AD. Structural analysis of the lipopolysaccharide from *Pasteurella multocida* genome strain Pm70 and identification of the putative lipopolysaccharide glycosyltransferases. *Glycobiology*. 2005 Apr; 15(4):323-33. Epub 2004 Nov 10. Erratum in: *Glycobiology*. 2005 May; 15(5):13G. PubMed PMID: 15537789.
7. Deeb BJ, DiGiacomo RF, Bernard BL, Silbernagel SM. *Pasteurella multocida* and *Bordetella bronchiseptica* infections in rabbits. *J Clin Microbiol*. 1990 Jan; 28(1):70-5. PubMed PMID: 2298879; PubMed Central PMCID: PMC269539.
8. 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. Review. PubMed PMID: 6371440.
9. Mathai MG, Ebeo CT, Byrd RP Jr, Fields CL, Roy TM. Cat cuddler's cough. *Tenn Med*. 2001 Mar; 94(3):98-9. PubMed PMID: 11242756
10. Christidou A, Maraki S, Gitti Z, Tselentis Y. Review of *Pasteurella multocida* infections over a twelve-year period in a tertiary care hospital. *Am J Infect Dis*. 2005; 1(2):107-10.
11. Duggal A, Waraich K, Cutrona A. *Pasteurella multocida* septicemia, due to close contact with a pet rabbit, in a splenectomized patient. *Infect Dis Clin Practice*. 2009; 17(3):196-7.
12. Talan DA, Citron DM, Abrahamian FM, Moran GJ, Goldstein EJ. Bacteriologic analysis of infected dog and cat bites. Emergency Medicine Animal Bite Infection Study Group. *N Engl J Med*. 1999 Jan 14; 340(2):85-92. PubMed PMID: 9887159.
13. <http://medical-dictionary.thefreedictionary.com/Animal+Bite+Infections>. Retrieved February 2nd 2014.