# Fatal Pasteurella Septicemia Associated With Herpes Zoster Lesions

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*Pasteurella multocida* is a gram-negative nonmotile coccobacillus. It has worldwide distribution and a vast natural reservoir, being frequently found as a commensal organism in the upper respiratory and gastrointestinal tracts of cats, dogs, and many other species of mammals and fowl.[1,2] Family physicians commonly consider *P. multocida* as a potential source of local wound infection following dog or cat bites. These localized infections usually resolve completely with appropriate antibiotic therapy, but they can sometimes be complicated by septic arthritis, osteomyelitis, or abscess. More serious infections are much less common and include septicemia, empyema, peritonitis, and meningitis.[3]

The following case illustrates an uncommon but extremely serious manifestation of *P. multocida* infection that resulted in the death of an elderly, debilitated patient. This case also suggests an unusual portal of entry for this organism, which has not been previously reported.

## Case Report

An 84-year-old man was brought to the emergency department by ambulance after being found by his neighbors on the floor of his home, having lowered himself there when he felt too weak to arise from a chair. He reported a history of increasing weakness and fatigue during the previous month but denied specific complaints of chest pain, shortness of breath, abdominal pain, or fever.

His medical history was remarkable for stable angina and a previous anteroseptal myocardial infarction 12 years before this admission. Additional medical history included hypertension and adult-onset diabetes mellitus. He was noncompliant with his medical regimen and was therefore on no current medications. The patient was a former smoker, who had quit smoking 22 years before admission. He lived alone with his two pet cats after the death of his wife approximately 5 years previously. He remained socially interactive with his neighbors, and no evidence of dementia or depression had been found on earlier evaluations.

On physical examination he was an alert and oriented elderly man who was markedly tachypneic but repeatedly denied shortness of breath. He was febrile at 101°F; his blood pressure was 140/50 mmHg, and he had a respiratory rate of 56/min and an irregular pulse rate of 80 to 105 beats per minute. His lung examination showed bilateral wet rales with markedly decreased breath sounds at the right base. He had an irregular cardiac rhythm with an $S_3$ and marked bilateral jugular venous distention. Pitting edema was noted in both lower extremities to the level of the knee. His abdomen was distended and tympanitic, but there was no evidence of fluid wave or shifting dullness. His skin examination was remarkable for extensive suppurative vesicular lesions with the characteristic appearance of herpes zoster lesions over the right lower quadrant, right flank, and buttock.

On an initial laboratory evaluation he had a leukocyte count of 11,800/mL with normal hemoglobin, hematocrit, and platelet counts. Sodium, potassium, and chloride levels were within normal limits, and his bicarbonate was 21 mEq/L. Arterial blood gas on mask-oxygen revealed Ph 7.351, $PO_2$ 70 mmHg, and $PCO_2$ 34.4 mmHg (oxygen saturation 93.1 percent). A chest radiograph showed a large right lower lobe

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density thought to be consistent with parenchymal infiltrate with effusion. An electrocardiogram showed atrial fibrillation with ventricular rate of 90 beats per minute and inverted T-waves with ST-segment depression in the lateral and inferior leads. Neither the atrial fibrillation nor the ST-T changes had been previously documented.

The patient was admitted to the medical intensive care unit with the working diagnoses of (1) community-acquired pneumonia with effusion, (2) new-onset atrial fibrillation with congestive heart failure, and (3) herpes zoster. Blood samples were cultured to rule out septicemia, and measurements of cardiac enzymes were obtained to rule out myocardial infarction. Intravenous cefuroxime and erythromycin were prescribed to provide coverage for community-acquired pneumonia. Multiple doses of intravenous furosemide were subsequently administered, to which the patient initially responded with a mild diuresis and subjective improvement in comfort. Urine output then decreased substantially, but a renal sonogram showed no evidence of renal obstruction.

Although the patient was alert and cooperative while undergoing his radiologic studies, shortly after returning from the x-ray department, he became nonresponsive and had decreasing respirations. He rapidly became apneic and was pronounced dead shortly thereafter. Cardiopulmonary resuscitation was not performed in accordance with the patient's previously expressed wishes.

Premortem blood cultures, which were returned several days later, grew *P. multocida* from four of four specimen bottles.

Subsequent postmortem examination was remarkable externally for the extensive herpetic lesions described previously. There was no evidence of an animal bite or scratch wound. The right pleural cavity contained approximately 1300 mL of cloudy, yellowish, purulent fluid with focal deposition of the pus material along the pulmonary and parietal pleurae. *P. multocida* was identified by special staining of the pleural exudate. Surprisingly, there was no evidence of acute pneumonia or abscess in the lung parenchyma, which showed changes consistent only with chronic emphysema and focal atelectasis. The heart was enlarged (700 g) and showed evidence of an old left ventricular myocardial infarction. The liver was noncirrhotic.

## Discussion

The case described illustrates an unusual series of complications resulting from infection with *P. multocida*. Either septicemia or empyema is a rare manifestation of this organism, and the combination of both septicemia and empyema is even less common.

Raffi, et al.[4] found only 95 reported cases of septicemia caused by *P. multocida* in a review of the English literature in 1987, and few cases have been reported since that time. Of these, only three of the cases found by Raffi, et al. were associated with pleural empyema, as were two additional cases reported by Fernando, et al.[5] and one case reported by Bohner, et al.[6] in which one of four blood cultures was positive for the organism. Only 18 cases of empyema that were due to the *P. multocida* organism have been reported to date.[3,5,6]

Most patients with either septicemia or empyema caused by this organism have been elderly and have either had chronic underlying lung disease or been otherwise immunocompromised secondary to cirrhosis or tumor.[4,7] The most common routes of infection were through the bite or scratch wound of a colonized animal or, less commonly, from inhalation of respiratory droplets by patients with chronic animal exposure.[8] Mortality from either septicemia or empyema caused by this organism is high, approaching 40 percent.[4,6]

This case report has several unique features that distinguish it from those previously reported. First, there was no evidence of bite or scratch wound either on physical examination or necropsy, making the most common route of infection unlikely in this patient. In addition, the absence of pulmonary parenchymal involvement on necropsy indicated the unlikelihood that inhalation of respiratory droplets was this patient's route of infection. It therefore appears most likely that the patient's broken skin from his zoster lesions was the portal of entry for the organism and the likely source of his septicemia. Retrospectively, family members provided further evidence of this route of infection by reporting that the patient would commonly allow his cats to lick his skin, including his abdomen. In addition, the lesions appeared secondarily infected on examination with drainage of pus and serosanguinous fluid.

It appears most likely, therefore, that the patient's pleural effusion was pre-existing (probably

secondary to his congestive heart failure) and was seeded hematogenously by his septicemia rather than by the more commonly expected respiratory route. This route of seeding of the empyema supports the suggestion in cases reported by Fernando, et al.[5] and Bohner, et al.[6] that pre-existing pleural effusions of various causes (i.e., heart failure, cirrhosis, tumor) might become secondarily infected with *P. multocida* as opposed to the more common scenario of development of a primary empyema with secondary seeding of the bloodstream.

## Conclusions

This case is the first, to our knowledge, in which herpes zoster lesions appear to be the source of septicemia with *P. multocida*. Although the presumptive evidence strongly supports this route of infection, it is of course possible that the organism entered the bloodstream through an animal bite that went undetected. In either scenario this case clearly illustrates the importance of considering uncommon sources of infection in elderly patients who experience functional decline. Family physicians should be aware that zoster-related skin lesions can predispose elderly patients to potentially life-threatening sources of infection. In addition, these lesions can serve as a warning indicative of an immunocompromised state in which unusual sources of infection might be considered.

Because of the potential for serious systemic infection with *P. multocida* and other organisms, it is commonly recommended that antimicrobial therapy should be given routinely as part of the treatment for recent, clinically uninfected bite wounds. Amoxicillin-clavulanate potassium (Augmentin) is often recommended because its broad spectrum of activity is well suited to deal with the wide range of organisms that commonly infect bite wounds.[9,10]

Although this patient's late presentation led to a fatal outcome, appropriate therapy early in the course of serious infection with *P. multocida* can be lifesaving. Parenteral penicillin is the drug of choice, with alternatives including ampicillin, tetracycline, or the parenteral cephalosporins.[2] It should be noted that *P. multocida* can be resistant to the penicillinase-resistant penicillins that are often used to treat other infections introduced through the skin.[9] For deep-seated infections, appropriate surgical drainage is important,[2] and open thoracostomy has been recommended for early treatment of empyema with this organism.[6]

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