

## *Pasteurella pneumotropica* Isolated from Bone and Joint Infections

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*Pasteurella pneumotropica* is a normal inhabitant of the oropharynx of mice, rats, cats, and dogs. We describe here the first reported case of joint and bone involvement in a human. The need for culturing and adequate prophylactic treatment is discussed.

The bacterial pathogen most frequently isolated from wounds inflicted by domestic animal bites is *Pasteurella multocida* (1). Other *Pasteurella* spp., which include *P. pneumotropica*, *P. ureae*, and *P. haemolytica*, are rarely isolated from humans. Reported here is an isolation of *P. pneumotropica* from a patient with possible septic arthritis or osteomyelitis or both after multiple dog bites. This is the first such reported case. Only 11 cases of *P. pneumotropica* infections have been reported. Most of these infections have been the result of dog and cat bites or exposure (2, 6, 8-10, 11, 13, 14, 18). There have been only five cases in which there has been no known history of animal exposure before infection.

*P. pneumotropica*, which was described by Jawetz in 1950 (7), is an animal pathogen causing clinical infections in mice and rat colonies (15). The bacterium is gram negative and oxidase positive (4). *P. pneumotropica* and *P. multocida* can be differentiated by urease, maltose, and mannitol reactions (17).

**Case report.** A 26-year-old female presented to the orthopedic clinic of University Hospital in July 1983 with the chief complaint of swelling and pain of the left hand. The onset of the pain was 11 days earlier, at which time the patient sustained multiple dog bites to the left upper and right upper extremities. She was seen at the emergency room and underwent closure of the laceration of the dorsum of the left hand. The patient was monitored in the family practice clinic for persistent "cellulitis." Since the pain and swelling had not resolved, she was referred to the orthopedic clinic. Physical examination revealed a puncture wound and point tenderness just radial to the metacarpal-phalangeal joint, third digit on the left hand, with increased pain on any attempted motion. The wound was erythematous, and there was localized swelling of the soft tissues. The patient was hospitalized with the diagnosis of a displaced articular fracture of the third metacarpal, probable resolving septic arthritis, and possible osteomyelitis. Arthrotomy, debridement of the affected joint with open reduction, and internal fixation of the displaced articular fraction of the joint were performed. Cultures were taken of the third metacarpal and joint, bone fragments, and puncture wound.

The microbiological cultures grew two different gram-negative bacilli. *P. pneumotropica* was isolated from the third metacarpal and joint and from bone fragments at the site. *Pseudomonas alcaligenes* was isolated from the puncture wound and bone fragments. The patient was treated

with cefoxitin and discharged 14 days postoperation. The pain had decreased to the point where flexion was increased to 50°. The patient was lost to follow-up.

Gram-negative, oxidase-positive bacilli isolated from the third metacarpal and joint and bone fragments were identified as *Pasteurella* or *Actinobacillus* spp. by using the API 20E (Analytab Products, Inc.) system. The bacteria were identified as *P. pneumotropica* by using supplemental conventional tests (17) (Table 1). The isolate was not sent to a reference laboratory for verification of identification. A second oxidase-positive, gram-negative bacillus, which was identified as a nonfermenter, was isolated from the puncture wound and bone fragments. This bacterium was identified as *Pseudomonas alcaligenes* by using the American Micro Scan (American Hospital Supply Co.) scheme.

*P. multocida* is the major cause of hand infections after bites inflicted by dogs and cats (1). These infections may result in septic arthritis or osteomyelitis (3, 8). We have described a *P. pneumotropica* infection resulting in the first reported case of bone and joint involvement. *P. pneumotropica* is endogenous in the upper respiratory tract of dogs, cats, and other mammals, including rats and mice. Cultures from the mouths of the two dogs were made, but *P. pneumotropica* was not recovered.

The API 20E system indicated that the isolates from the cultured bone fragments, joint, and third metacarpal of this patient were either *Pasteurella* or *Actinobacillus* spp. The *Actinobacillus* spp. *A. lignieresii*, *A. equuli*, and *A. suis* are primarily pathogens of cattle, horses, sheep, and swine, but infections can occur in humans after a bite or other exposure to these animals (17). With the use of conventional laboratory tests, a final identification was made as *P. pneumotropica*. To differentiate between *P. pneumotropica* and *Actinobacillus* spp., indole, ornithine, and lysine decarboxylase tests as well as mannitol fermentation were used.

*Pseudomonas alcaligenes* was also cultured from the wound site and bone tissue. This bacterium is rarely an etiological agent of infections. There have been only three documented reports of *Pseudomonas alcaligenes* infections (16). This bacterium is primarily isolated as a contaminant in clinical specimens and from the environment (5, 12). Because of the nature of the trauma, location of the wound, and environmental setting in which the wound was inflicted, there is every possibility that this organism was a contaminant.

MICs for each isolate were determined. Both microorganisms isolated were susceptible to first-, second-, and third-generation cephalosporins, tetracycline, piperacillin, trimethoprim/sulfamethoxazole, and the aminoglycosides amikacin, gentamicin, and tobramycin. Susceptibility to penicillin was not tested for the *P. pneumotropica* isolate;

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TABLE 1. Characteristics of the clinical isolate and similar gram-negative bacilli<sup>a</sup>

Test	Reaction <sup>b</sup>			
	Isolate	<i>P. pneumotropica</i>	<i>P. multocida</i>	<i>Actinobacillus</i> spp.
Oxidase	+	+	+	+
Growth on MacConkey agar	-	v	-	v
Nitrate reduction	+	+	+	+
Acid from:				
Glucose	+	+	+	+
Maltose	+	+	-	+
Mannitol	-	-	v	v
Sucrose	+	+	+	+
Urease activity (slant and broth)	-	+	-	+
Simmons citrate	-	-	-	-
Lysine decarboxylase	+	v	-	-
Ornithine decarboxylase	+	+	+	-
Indole	+	+	+	-
Triple sugar iron slant, acid	+	+	+	+
Triple sugar iron butt, acid	+	+	+	+

<sup>a</sup> Data for *P. pneumotropica*, *P. multocida*, and *Actinobacillus* spp. were determined by the method of Weaver and Hollis (17).

<sup>b</sup> +, Positive (90%) within 24 to 48 h; -, no reaction; v, >10 and <90% positive.

however, this bacterium is known to be susceptible (17).

Wound, bone, and joint infections caused by *P. pneumotropica* are rare in humans. Wounds inflicted by dogs and cats should be cultured before prophylactic therapy. We recommend, as do Lucas and Bartlett (8), that bacteriology laboratories be advised that the wound is of animal origin to ensure proper identification of the isolated microorganisms. Proper wound management should include adequate cleansing, opening and debridement of the wound, and prophylactic antimicrobial therapy. This therapy should include cephalosporins or penicillin G. If the patient develops cellulitis within 24 h after the bite, pasteurellosis should be considered

as a possible diagnosis until it can be confirmed by the culture results.

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