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A Case of Recurrent *Pasteurella* Bacteremia in an Immunocompetent Patient with No Animal Bite

Authors' Contribution:
Study Design A
Data Collection B
Statistical Analysis C
Data Interpretation D
Manuscript Preparation E
Literature Search F
Funds Collection G

DEF **Fnu Zarlisht**
EF **Muzammil Khan**

Department of Medicine, Our Lady of Lourdes Hospital, Binghamton, NY, U.S.A.

Corresponding Author: Fnu Zarlisht, e-mail: linnyc777@yahoo.com
Conflict of interest: None declared

Patient: Male, 61
Final Diagnosis: Recurrent *pasteurella* bacteremia
Symptoms: Ankle pain
Medication: —
Clinical Procedure: —
Specialty: Infectious Diseases

Objective: Rare disease

Background: *Pasteurella multocida* is a gram negative-penicillin sensitive bacterium and is part of normal respiratory microbiota of animals (e.g., cats and dogs) and some birds. Various infections in humans, such as cellulitis, rarely bacteremia, endocarditis, meningitis, and septic arthritis, are a result of domestic cat or dog bites. These infections are rarely seen in an immunocompetent person, without an associated animal bite.

Case Report: We present a case of refractory *Pasteurella multocida* bacteremia without any animal bite in an immunocompetent person.

Conclusions: *Pasteurella multocida* bacteremia has been seen in immunocompromised patients and mostly after a cat or dog bite or scratch but might also happen in immunocompetent humans with only pet licking rather than biting, which might increase hospital and emergency department visits or admissions in the future.

MeSH Keywords: Bacteremia • *Pasteurella Multocida* • Thrombophilia

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Background

Pasteurella multocida is a gram negative-penicillin sensitive bacterium and is part of normal respiratory microbiota of animals (e.g., cats and dogs) and some birds. Usually systemic infections occur after an animal bite or a scratch. Most of the resulting systemic infections, such as cellulitis, septic arthritis, endocarditis, and meningitis, are observed in immunocompromised patients [1–3]. We present a case of *Pasteurella multocida* bacteremia in an immunocompetent patient with only cat licking [3].

Case Report

A 61-year-old male presented due to chief complaint of left foot and ankle swelling and generalized body aches with intermittent chills. The patient had no shortness of breath, chest pain, abdominal pain, urinary symptoms, diarrhea, headaches, runny nose, sore throat, tick bites, or skin rashes. The patient had a healthy cat which licks him, but he had no cat bites or any other bites. The cat's immunization status was up-to-date as per the patient. This patient had no significant past medical history and his outpatient primary care clinic visits were up-to-date. He was not taking any medications at home.

On presentation, the patient was not in any acute respiratory distress, but was tachycardiac (heart rate 128 beats/minute), blood pressure 86/53 mm Hg, saturation was 95% on room air and he was afebrile. The patient was alert and oriented to time, place, and person. His cardio-pulmonary and gastro-intestinal examination was unremarkable. His left ankle was tender but not erythematous or warm and his left foot was swollen; other extremities were unremarkable. He had good and equal bilateral pulses.

His laboratory tests revealed white cell count (WBC) of 7.5 K/uL with 10% bandemia, hemoglobin 13.5 gm/dL, and platelets

72 K/mcL. He had acute kidney injury (creatinine 1.41 mg/dL, glomerular filtration rate 51 mL/min/1.73 m²), low potassium at 3.4, and lactic acidosis of 4.1 mmol/L. Red blood cell morphology did not show any schistocytes. Urinalysis was negative for any infections, and only showed high specific gravity of 1.031. Liver function test was positive for mildly deranged AST/ALT at 74/72 U/L and total bilirubin 1.4 mg/dL. Procalcitonin was 29.83 ng/mL.

During the next 20 days, his WBC continued to worsen, peaked to 20 K/μL on day 6 then trended down. Hemoglobin remained stable, sepsis-induced thrombocytopenia improved from 72 K/mcL to 262 on day 8. Mild acute kidney injury resolved. Liver function tests initially worsened but then resolved and lactic acidosis also resolved. A detailed follow-up of these tests is shown in Table 1.

A computed topography (CT) chest-abdomen-pelvis did not show any pulmonary consolidations but it showed multiple prominent mesenteric lymph nodes largest measuring 3.8×2.6 cm in central mesentery, which was likely infectious, and their sizes improved upon follow-up repeat CT scan. An ultrasound of the left lower extremity was done, which ruled out deep venous thrombosis on presentation.

Blood cultures were drawn; the patient was started on broad spectrum intravenous antibiotics meropenem (500 mg three times a day), vancomycin (1 gm two times a day) and admitted to the intensive care unit.

On day 2, magnet resonance imaging (MRI) of his left ankle-foot was done which showed diffuse soft tissue edema and reticulation around the ankle. A trans-thoracic echocardiogram ruled out endocarditis. The patient was sent for arthrocentesis but due to lack of fluid in the ankle joint, a tap was not possible.

His blood cultures came back positive for *Pasteurella multocida* for which the intravenous antibiotic meropenem was continued

Table 1. Laboratory follow up of the patient during first hospital stay.

	Day 1	Day 4	Day 6	Day 8	Day 10	Day 20
WBC (k/uL)	7.5	15.8	21	18	13.8	9.9
Hemoglobin (gm/dl)	13.5	13.2	13.6	12.1	10.5	11.1
Platelet (k/mcL)	72	36	99	262	587	661
Creatinine/GFR (mg/dL)/(mL/min/1.73 m ²)	1.41/51	1.03/>60	–	–	–	0.54/>60
AST (unit/liter)	74	223	93	71	62	
ALT (unit/liter)	72	167	82	69	89	
Bilirubin (mg/dl)	1.4	1.6	1.2	0.8	0.6	
Lactic acid (mmol/L)	4.1	2.1				

Table 2. Rheumatologic Laboratory investigations.

Fibrinogen	744 mg/dl (range 180–440)
Prothrombin time	11.9 sec (range 9–12.5)
Activated partial prothrombin time	27 sec (24–33)
Anti-thrombin III	78% (range 76–128)
Lupus-anticoagulant	Moderately present
Factor V Leiden	Negative
HIT antibody	0.146 (normal <0.399)
Complement C3	114 mg/dl (range 90–180)
Complement C4	29 mg/dl (range 10–40)
Protein C activated	77% (range 83–168)
Protein S Free	89% (range 74–147)
Methylene tetrahydrofolate reductase(MTHFR c. 1286 A>C)	Negative
Methylene tetrahydrofolate reductase(MTHFR c. 665 C>T)	Negative
Antinuclear antibody (ANA)	Negative
Double stranded DNA antibody (DsDNA)	Negative
Cardiolipin IgM	144 MPL (range 0–12)
Cardiolipin IgA	7 APL (range 0–11)
Cardiolipin IgG	22 GPL (range 0–14)
RNP antibody	Negative
Smith antibody	Negative
SSA antibody	Negative
SSB antibody	Negative
SCL-70 antibody	Negative
Centromere antibody	Negative
A phagocyte antibody IgG and IgM	Normal
IgA total	455 mg/dl (range 66–436)
IgM total	51 mg/dl (range 43–279)
IgG total	921 mg/dl (range 791–1643)
Hepatitis C antibody and B core antigen	Negative
Cryoglobulin	Negative
Lyme IgM and immunoblot	Negative
Malaria smear	Ruled out malaria and babesia

and ciprofloxacin was added for double coverage. *Pasteurella multocida* cultures showed very good sensitivity to ciprofloxacin, meropenem, and piperacillin-tazobactam.

Due to worsening left lower extremity edema, an ultrasound of the left lower extremity was repeated on day 6, which showed new partially occlusive deep venous thrombus in the

left popliteal vein and the left posterior tibial vein, for which he was started on enoxaparin treatment on day 8 once his sepsis-induced thrombocytopenia was resolved.

During follow-up, the patient continued to be in the intensive care unit; his mental status remained stable. He started to have purplish discoloration of all finger and toe tips.

Extensive workup for disseminated intravascular coagulation, vasculitis, hypercoagulable syndrome, and autoimmunity was done, which showed moderately positive lupus anticoagulant antibodies, decreased protein-C activity, and positive anti-cardiolipin IgM antibodies; details are shown in Table 2.

This patient was diagnosed with thrombophilia (causing left lower extremity DVT) secondary to positive anticardiolipin antibodies, moderately positive lupus anticoagulants and low protein-C activity. Due to low-normal complements level, ANA and DsDNA, lupus, vasculitis, connective tissue disease, and rheumatoid arthritis were of low suspicion. Multiple blood cultures were negative prior to discharge.

Multiple sub-specialties were involved in this case, including rheumatologist, vascular surgeon, orthopedic, and infectious disease and it was mutually decided to complete antibiotics for four weeks once blood cultures are negative and to continue anticoagulation for thrombophilia. The patient was discharged to a rehabilitation center after his prolonged hospital stay.

In the outpatient setting, the patient continued to have digital ulcerations and his right forefoot turned into wet gangrene despite of being on antibiotics.

He was readmitted for right fore-foot amputation and his blood cultures were sent again. He underwent right fore-foot amputation and his blood cultures came back positive again for *Pasteurella multocida*. He was started again on intravenous antibiotic piperacillin-tazobactam (3.375 gm three times a day) for recurrent *Pasteurella multocida* bacteremia. Deep tissue cultures and bone biopsy from the gangrenous, infected toes were sent out and results showed enterococcus group-D and staphylococcus coagulase negative for which he was started on daptomycin intravenously (4 mg/kg every 24 hours) according to culture sensitivity. Further workup showed he had left ankle-knee osteomyelitis for which he underwent below knee amputation. The patient was discharged again to a rehabilitation center.

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During this whole course of stay, it was not clear why this patient had recurrent *Pasteurella* bacteremia without any clear source.

Discussion

Pasteurella multocida infections are usually seen in cat (75%) and dog (50%) bites. Licking of non-intact wounds can also lead to various infections. A literature review showed direct transmission occurs through contact with these animals or indirect transmission through infected blood transfusion, transplacental or close contact with a colonized person.

This bacteremia causes a variety of infections like cellulitis, skin abscesses, septic joints, bacteremia, endocarditis, meningitis, and spontaneous bacterial peritonitis in cirrhotic patients [1–4]. Mortality from *Pasteurella multocida* bacteremia has been documented as 30% [5–7].

Usually these diseases have been documented in immunocompromised patients like patients with active cancer, HIV positive, cirrhotic, chronic kidney diseases, or patients after chemotherapy and radiotherapy [8,9]. In this case, the patient was completely immunocompetent and there was no pet bite.

Conclusions

The number of domestic animals is increasing day by day in the USA. We should consider this organism as a differential diagnosis not only in immunocompromised patients but in immunocompetent patients as well. This case also shows that this organism can cause diseases not only with pet bites or scratches but also with licking, due to which emergency department visits or hospital admissions will likely increase in the future.

Conflicts of interest

None.