

CLINICAL VIGNETTE

Cat Scratch Disease in a Teenager

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Introduction

We report a case of a teenager who presented with regional lymphadenopathy and was found to have positive serology for both *Brucella* and *Bartonella henselae*. The enlarged lymph node progressed to abscess formation, which is an atypical clinical manifestation of *Bartonella henselae* induced lymphadenopathy.

Case report

An otherwise healthy 19-year-old girl presented with a one-month history of enlarging, erythematous, and very painful swelling in the left inguinal region. The patient denied prescription, over-the-counter or illicit drug use. The patient stated inguinal swelling started as an infected hair follicle. The patient attempted unsuccessfully to express pus from the swollen area. She reported intermittent fevers up to 38.8°C, chills and night sweats with a 2-pound weight loss over two months prior to presentation. She denied any sick contacts and was free of abdominal pain, dysuria or vaginal discharge. The patient lived with her family in the San Fernando Valley and had an array of animals including cats, rabbits and a wild squirrel. She did not recall any recent scratches or tick bites. However, she did drink unpasteurized goat's milk and admitted travelling to Wyoming 4 months prior to admission. She used condoms with multiple heterosexual contacts. Her last sexual contact was two months prior to presentation. She was treated with Bactrim, doxycycline and azithromycin for two weeks prior to presentation by her primary care physician. Despite outpatient antibiotic therapy, the patient's inguinal lymphadenopathy was not improving and her constitutional symptoms were worsening and she was referred for admission.

On admission, the patient's vital signs were: temperature 36.1°C; heart rate 100bpm; blood pressure 134/93 mmHg; respiratory rate 14bpm; SaO₂ 99% on room air. Her physical examination revealed an enlarged 4 x 6 cm left inguinal lymph node with overlying erythematous spreading to left labia majora. The lymph node was warm, firm and very tender to palpation with no fluctuance or discharge. The lymph node was mobile.

Laboratory values were unremarkable apart from erythrocyte sedimentation rate of 23 mm/hour. The patient underwent a computed tomographic scan, which showed a heterogeneous enhancing lesion in the left inguinal location, which did not have

characteristics of abscess and did not extend into abdomen or pelvic cavity. Since her lymphadenopathy did not respond to prior antibiotic therapy, methicillin-resistant *Staph. aureus* infection was considered, and she was started on vancomycin.

Over the subsequent two days the white cell count increased to 12.3 thousand cells/microliter, and the patient's inguinal swelling became fluctuant with spontaneous discharge consistent with an abscess. A bedside incision and drainage was done (see Figure 1) revealing bloody pus. The specimen stain and culture was negative for *Yersinia pestis*. There was no other bacteria or fungus identified. Blood and urine cultures were also negative. Other work up included a monospot test, *Yersinia enterocolitica*, Lyme serology, tularemia serology, lymphogranuloma venereum (LGV) serology, HIV, hepatitis panel, toxoplasma gondii serology, blood cryptococcal antigen, rapid plasma regain (RPR), cytomegalovirus (CMV) serology, and urine Histoplasma antigen- all which were reported as negative. *Brucella* specific IgM was positive at 2.20 dilution (nl <0.8), while *Brucella* specific IgG was negative. In addition, *Bartonella henselae* was positive for IgG at 1:1024 and IgM at 1:20.



Figure 1. The appearance of left inguinal lymphadenopathy post incision and drainage in cat scratch disease

Taking into account patient's risk factors and serologies, a diagnosis of cat scratch disease was favored. The positive test for brucellosis was thought to be due to assay cross-reactivity rather than actual disease. Vancomycin was stopped and patient was treated with ciprofloxacin with marked improvement. The patient was followed up after discharge her painful lymphadenopathy had resolved.

Discussion

Cat scratch disease is an infectious disease characterized by self-limiting painful regional lymphadenopathy following the scratch or bite of a cat, typically a kitten. Although usually benign, cat scratch disease can manifest with visceral, central nervous system and ocular involvement.

Cat scratch disease was described more than 50 years ago, but it was not until 1983, when an infectious etiology of the disease was revealed using a Warthin-Starry stain, which demonstrated a small, curved, pleomorphic, Gram negative rod¹. The causative organism was first believed to be *Afipia felis*, but current serologic and culture studies provide evidence that *Bartonella henselae* is nearly exclusively responsible for cat scratch disease²⁻⁴. However, other pathogens, including *Afipia felis* and *Bartonella clarridgeiae* have been isolated from a fraction of patients with cat scratch disease⁵. Interestingly, 3.1-61.1% of the general population are seropositive, while only few patients ever experience symptoms, suggesting that only minority of exposures to *Bartonella henselae* result clinically into cat scratch disease⁶. Transmission of *Bartonella henselae* has been linked to exposure to cats, which carry the bacteria in their blood, and fleas^{3,7}. The disease presents typically two weeks following a cat scratch or bite, or a flea bite.

Cat scratch disease generally occurs in children and young adults most commonly less than 21 years of age. A limited survey in 1993 by the Centers for Disease Control and Prevention reported an annual incidence of 22,000 cases of cat scratch disease with highest attack rate in those under the age of 10^{8,9}. Cat scratch disease shows seasonal variation with 70-90% of cases occurring in fall and early winter months, possibly due to midsummer rise in cat offspring and increased flea infestation.

Pathogenesis of cat scratch disease is not fully understood. In humans *Bartonella henselae* invades endothelial cells causing an acute inflammatory reaction with cytokine release. Eight-five to ninety percent of cases present as cutaneous vesicals, papules or pustules at the site of inoculation. The incubation period is typically three to ten days and the primary inoculation lesion lasts one to three weeks^{10,11}. Although uncommon, other cutaneous lesions have been reported in patients with cat scratch disease, including transient macular eruption, erythema

multiforme, erythema nodosum, and thrombocytopenic purpura¹¹.

Regional lymphadenopathy is the hallmark of cat scratch disease and appears proximal to the inoculation site about two weeks after the introduction of organism into the skin. As seen in our patient, the lymph nodes are almost always tender and suppurate spontaneously in 10-15% of patients¹¹. Lymphadenopathy commonly involves axillary nodes, followed by cervical and inguinal regions. Occasionally patients present with several enlarged nodes in the same anatomical region, but rarely with generalized lymphadenopathy. Cat scratch disease associated lymphadenopathy usually resolves in one to four months, but may persist for as long as one to three years.

Constitutional symptoms are usually mild and may include low-grade fever, chills, malaise, fatigue, anorexia, nausea, headache, abdominal pain, and backache.

Patients with a localized infection generally have a self-limiting disease with favourable prognosis. However, some patients for unknown reasons get bloodborne disseminated infection, which can have life-threatening complications. Involvement of the liver, spleen or both is a common manifestation of cat scratch disease in children second to lymphadenopathy alone^{12,13}. In one prospective study *Bartonella henselae* was the third most common cause of fever of unknown origin and prolonged fever (fever greater than 38.8°C for two weeks or longer) in children, highlighting the need to consider cat scratch disease in the initial work-up of any child with an unexplained fever^{14,15}. Dissemination into the ocular region can give an atypical presentation of cat scratch disease as Perinaud's oculoglandular syndrome. This is seen in 5-6% of cases and is characterized by conjunctivitis, conjunctival granuloma and ipsilateral periauricular lymphadenopathy¹⁶. Other ocular manifestations include neuroretinitis, papillitis, optic neuritis, and focal retinochoroiditis. A variety of neurological manifestations have also been observed in patients with cat scratch disease- encephalopathy, which typically presents with abrupt alteration in mental status and may progress to coma, seizure, hemiparesis, transverse myelitis, radiculitis, and cerebellar ataxia¹⁷. Musculoskeletal complications include myalgia, arthritis, tendinitis, osteomyelitis, and neuralgia, which can be severe and disabling. Some reports document rare and atypical manifestations of cat scratch disease, such as hypercalcemia, deep tissue neck infection, culture negative endocarditis, and pneumonia¹⁸⁻²⁰.

The differential diagnoses of cat scratch disease are mainly those of infectious and malignant causes of lymphadenopathy¹¹. Painful lymph node enlargement points to infection and include bacterial adenitis (usually *Staphylococcus aureus* or group A beta-hemolytic streptococci), viral lymphadenopathy (CMV, HIV, Epstein-Barr virus), lymphadenopathy with

cutaneous lesion (atypical mycobacteria, *Nocardia* species, *Francisella tularensis*, *Erysipelothrix rhusiopathiae*, *Yersinia pestis*, and *Borrelia burgdorferi*), protozoan (toxoplasmosis), and rarely fungal (histoplasmosis and sporotrichosis). In the case of atypical presentation or prolonged systemic symptoms lymphoma should be suspected and lymph node biopsy done to exclude malignancy.

Diagnosis of cat scratch disease is based on typical clinical findings of tender regional lymphadenopathy, history of cat or flea contact and positive *Bartonella henselae* antibody titer ratio of $\geq 1:64$ ^{2,21}. However, serologic testing for *Bartonella henselae* has been associated with poor sensitivity, cross-reactivity between *Bartonella henselae*, *Bartonella quitana* and *Brucella*. *Bartonella* serology is positive in 4-6% of the general asymptomatic population^{22,23}. A definite diagnosis of cat scratch disease can be obtained from tissue PCR and culture but is reserved for atypical cases of disease or for research purposes. Although isolation of *Bartonella henselae* from culture gives an absolute diagnosis, the organism is very difficult to isolate from tissue specimens.

The literature on use of antibiotics in the treatment of cat scratch disease is rather limited. Some experts suggest antibiotic treatment for all patients with cat scratch disease, while others consider antibiotic therapy for severe or systemic disease and in immunocompromised patients. Azithromycin is the preferred antibiotic, which in a randomized placebo-controlled trial markedly reduced lymph node size after 5 days of treatment²⁴. Interestingly, our patient did not respond to azithromycin or bactrim, which raised the issue of resistance or noncompliance. Other antibiotics that are effective for cat scratch disease include clarithromycin, rifampicin, trimethoprim, and ciprofloxacin^{25,26}. Our case report adds evidence for the effectiveness of ciprofloxacin against *Bartonella henselae*.

Conclusion

Regional lymphadenopathy is the *sin qua non* of cat scratch disease. Therefore *Bartonella henselae* should always be in the differential diagnosis of patients who present with a tender swollen lymph node, especially those under the age of 21. However, due to the wide range of systemic manifestations of this disease, it should not be overlooked in patients with atypical presentations, such as young children, in whom prolonged fever is the presenting complaint.

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