CASE REPORT

A serologically proven case of cat-scratch disease presenting with neuroretinitis

Benjamin CY Chu 朱仲賢
Victor TY Tam 譚德祐

Cat-scratch disease is a clinical syndrome that usually presents as a self-limiting illness featuring regional lymphadenopathy, fever, and small skin lesions in association with a cat scratch or bite. It is caused by the Gram-negative bacillus *Bartonella henselae*, which commonly affects children and young adults. Ocular bartonellosis is the most common atypical manifestation of cat-scratch disease. It can present with a wide spectrum of ocular diseases including neuroretinitis, Parinaud's oculoglandular syndrome, and other forms of intra-ocular inflammation. This case report describes cat-scratch disease neuroretinitis in a 10-year-old girl who presented with typical signs, including optic disc swelling and a macular star, preceded by pyrexia of unknown origin and cervical lymphadenopathy.

Introduction

Cat-scratch disease (CSD) is a benign, self-limiting illness that usually presents with lymphadenopathy and fever. It is caused by infection with *Bartonella henselae* following cat bites or scratches. Approximately 95% of patients report a history of cat contact and about 73% of patients have had a cat scratch.[1] Typical manifestations of CSD include a non-tender papule at the primary inoculation site, tender regional lymphadenopathy, fever, fatigue, and headache. About 25% of CSD patients have atypical manifestations with ocular involvement, encephalopathy, hepatosplenic infection, osteomyelitis, endocarditis, and paronychia.[2] Common ocular presentations include Parinaud's oculoglandular conjunctivitis and neuroretinitis. This case report illustrates a serologically proven case of CSD presenting with neuroretinitis and lymphadenopathy.

Case report

A 10-year-old Chinese girl who enjoyed good past health was referred to our ophthalmology unit in Caritas Medical Centre, Hong Kong, for evaluation of acute visual loss in her right eye. Before the referral, she had been admitted to the paediatric unit of Yan Chai Hospital, Hong Kong, for investigation of pyrexia of unknown origin.

The girl presented with a history of undulating fever and headache for 1 month from mid-April 2008. The fever was usually high—up to 39.7°C—with spikes at night. It was preceded by upper respiratory tract symptoms. She also had an enlarged, tender solitary cervical lymph node in her left mid posterior triangle. Despite exhaustive investigations and microbiological testing, no identifiable cause of her pyrexia could be found. She was given intravenous penicillin empirically but the fever did not subside.

Her condition remained static until mid-May 2008 (1 month after the onset of fever and systemic symptoms) when she suffered acute right visual loss. She was referred to us 1 day later. On examination she had a right relative afferent pupillary defect. Her best-corrected visual acuity was hand movement OD, 1.0 OS. She could read only the first Ishihara colour plate with her right eye but had full vision in her left eye. Her intra-ocular pressure and anterior chamber were normal. The most striking clinical sign was right eye neuroretinitis characterised by right optic disc oedema and a macular star (Fig 1). The retinal veins were slightly dilated in her right eye. There were also multiple retinal exudates in the mid-peripheral right fundus. Her left eye fundus was unremarkable. Visual field testing revealed a large central scotoma in her right field. She had normal extra-ocular muscle movements, no diplopia, and no pain. Fundus fluorescein angiography showed right peripapillary leakage (Fig 2). Imaging, including a B-scan of the eyes and computed tomography of the orbits, was also normal.

The fever, systemic upset and lymphadenopathy, made an infective cause of her unilateral neuroretinitis the most likely diagnosis. A number of microbiological tests, including tests for tuberculosis, syphilis, influenza, Epstein-Barr virus, adenovirus, and streptococcus were negative. Her chest X-ray was clear.

Key words
Bartonella henselae; Cat-scratch disease; Eye infections, bacterial; Optic neuritis

Hong Kong Med J 2009;15:391-3

Caritas Medical Centre, Shamshuipo, Kowloon, Hong Kong
BCY Chu, FCOphth, FHKAM (Ophthalmology)
VTY Tam, FCOphth, FHKAM (Ophthalmology)

Correspondence to: Dr BCY Chu
E-mail: dr_cychu@yahoo.com.hk

因視神經網膜炎並以血清學檢測確診的貓抓病病例

貓抓病的臨床徵狀通常可自行痊癒，例如與貓抓或叮咬有關的局部淋巴結病、發熱和小皮膚病患。由革蘭氏陰性巴東氏桿菌引致的貓抓病，患者多為孩童和年輕人。因感染巴東氏桿菌引致的眼疾，是最常見的貓抓病非典型徵狀，這包括視神經網膜炎、Parinaud眼腺體綜合徵、各種內眼發炎等。本文報告一名患有視神經網膜炎和貓抓病的10歲女童，起初因原因不明的發熱和子宮頸淋巴結病入院，後出現視神經網膜炎的典型病徵，包括視神經盤脹大和呈星形的黃斑囊樣水腫。

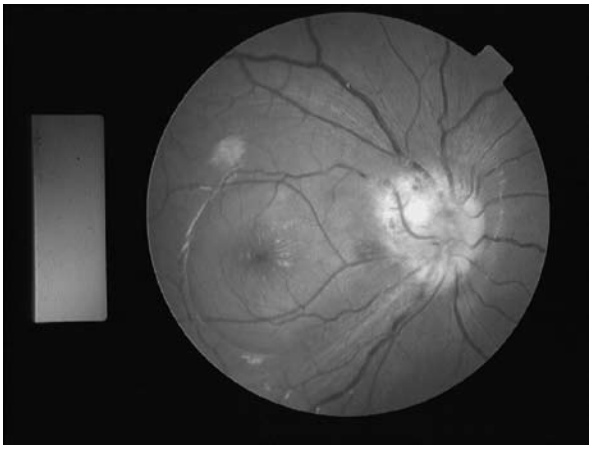

FIG 1. Right fundus photograph demonstrating marked disc swelling and a macular star at early presentation

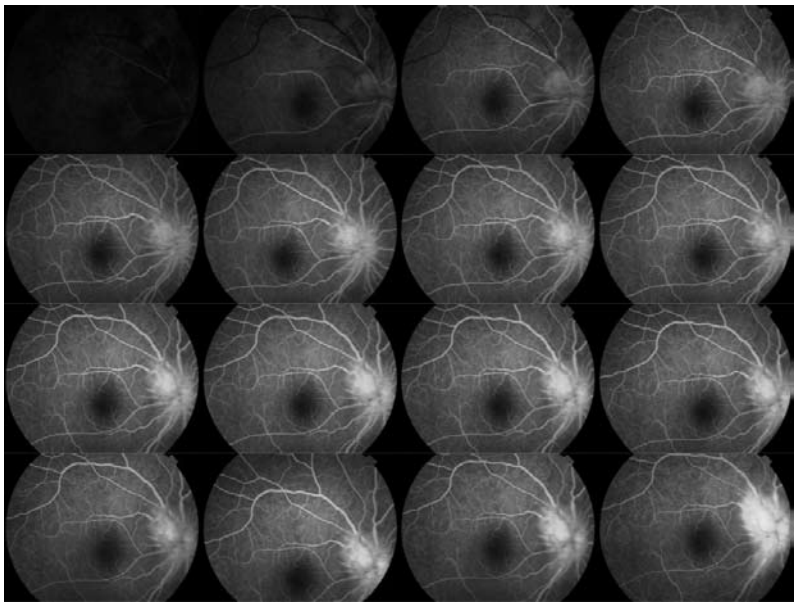

FIG 2. Fundus fluorescein angiogram showing leakage at the peripapillary region but not the macula

When questioned further she revealed that she had travelled to Mainland China with her parents in March 2008. There she had close contact with cats and dogs but she could not recall any cat scratches or bites. She had no pets at home. Based on this information, we ordered a serological examination for *B henselae*, which was positive (*B henselae* immunoglobulin G level >1:256). She was thus diagnosed with CSD with neuroretinitis.

In late May 2008, the girl was given oral rifampicin 300 mg daily for 1 week and doxycyclin 100 mg twice a day for 5 weeks. The fever subsided on commencement of treatment and the lymphadenopathy gradually lessened, too. Her visual acuity and colour vision improved dramatically. Her right visual acuity was 0.3 and 0.5 at 2 weeks and 5 weeks post-treatment, respectively. In early October 2008 (3 months after the diagnosis), her best-corrected visual acuity was 1.0 OU. Her colour vision was back to normal but she still had a mild right central scotoma. The right disc oedema and peripheral retinal exudates resolved gradually but the macular star took much longer to resolve. At her last follow-up visit in October 2008, all the fundal signs had disappeared. She had no disease recurrence after finishing treatment and no optic atrophy was noted.

Discussion

Cat-scratch disease is a self-limiting infection caused by *B henselae*, associated with a cat scratch or bite.[3] Ocular *Bartonella* infection was first described by Henri Parinaud in 1889, when he reported three patients with fever, follicular conjunctivitis, and lymphadenopathy.[4,5] These clinical features became known as Parinaud's oculoglandular syndrome and they were found to be associated with CSD. The causative organism was unknown until Golnik et al[3] provided the first serologic evidence of systemic *Bartonella* infection in patients with neuroretinitis in 1994.

Typical CSD presentations include fever, regional lymphadenopathy, and a non-tender papule in the scratch line.[6] The eye is the most common site for atypical manifestations of CSD, either via direct inoculation or after eye rubbing, therefore recognition of specific ocular signs often leads to specific serologic testing and the correct diagnosis. Parinaud's oculoglandular syndrome is the most common ocular complication of CSD, followed by neuroretinitis.[7] Other ocular manifestations of CSD include uveitis, retinal white dot syndrome, retinal vascular occlusion, vasculitis, and serous retinal detachment.

Neuroretinitis is characterised by optic disc swelling in the presence of a partial or complete

macular star.[8] It is usually unilateral, although bilateral cases have also been reported. The macular star may not be apparent clinically until 1 to 2 weeks after the onset of visual symptoms.[9] A patient presenting with papillitis should be reevaluated after 2 weeks for any macular star, especially if neuroretinitis is suspected. Neuroretinitis can be caused by a number of other infectious agents, such as Lyme disease, tuberculosis, mumps, syphilis, toxoplasmosis, toxocariasis. A study into the prevalence of CSD in patients with neuroretinitis found that 64.3% of patients had evidence of past or present CSD based on positive serologic analysis for *B henselae*, suggesting that CSD is the most common cause of this syndrome.[10]

The pathogenesis of acute *B henselae* neuroretinitis is unknown, but both neural and retinal tissues are involved in the disease process. Fundal changes may be the result of vasculitis or direct bacterial invasion of the vasculature.[11] Acute visual loss is usually caused by retinal and peripapillary oedema rather than optic nerve dysfunction. Visual improvement does not usually follow the resolution of the macular star but residual temporal disc pallor, persistent afferent pupillary defects, and decreased contrast sensitivity have been reported.[12]

In the past, a diagnosis of CSD relied on finding at least three of four criteria: (1) a history of cat exposure; (2) a positive skin test in response to CSD antigen; (3) characteristic lymph node lesions; and (4) negative laboratory investigations for unexplained lymphadenopathy.[13-15] Serological testing for *B henselae* is now the most accurate and reliable means of diagnosing CSD. Approximately 90 to 100% of patients suspected of having CSD are seropositive for *B henselae* but seroconversion may take up to 4 to 6 weeks.[16] Serology procedures include an indirect immunofluorescence test, enzyme-linked immunoassays, and polymerase chain reaction.

Most CSD cases resolve spontaneously within a month or two and do not require treatment. A lack of controlled studies makes the role of antibiotics in the treatment of CSD controversial. Nevertheless, use of doxycyclin and rifampicin for 4 to 6 weeks appears to shorten the course of CSD neuroretinitis and hasten visual recovery.[12] As yet, there is no evidence that steroid therapy has a role in CSD. The prognosis is quite good, but patients with full clinical resolution can later develop mild post-infectious optic neuropathy.[12]

References

1. Jones DB. Cat-scratch disease. In: Pepose JS, Holland GN, Wilhelmus KR, editors. Ocular infection and immunity. St. Louis: Mosby-Year Book; 1996: 1389-96.
2. Windsor JJ. Cat-scratch disease: epidemiology, aetiology and treatment. Br J Biomed Sci 2001;58:101-10.
3. Golnik KC, Marotto ME, Fanous MM, et al. Ophthalmic manifestations of *Rochalimaea* species. Am J Ophthalmol 1994;118:145-51.
4. Ouvrier R. Henri Parinaud and his syndrome. Med J Aust 1993;158:711,714.
5. Wright RE. Isolation of Verhoeff's leptothrix in a case of Parinaud's syndrome. Arch Ophthalmol 1937;18:233-6.
6. Midani S, Ayoub EM, Anderson B. Cat-scratch disease. Adv Pediatr 1996;43:397-423.
7. Smith DL. Cat-scratch disease and related clinical syndromes. Am Fam Physician 1997;55:1783-9,1793-4.
8. Williams N, Miller NR. Neuroretinitis. In: Pepose JS, Holland GN, Wilhelmus KR, editors. Ocular infection and immunity. St. Louis: Mosby Year Book; 1996: 601-8.
9. Ghauri RR, Lee AG. Optic disc edema with a macular star. Surv Ophthalmol 1998;43:270-4.
10. Suhler EB, Lauer AK, Rosenbaum JT. Prevalence of serologic evidence of cat scratch disease in patients with neuroretinitis. Ophthalmology 2000;107:871-6.
11. Wong MT, Dolan MJ, Lattuada CP Jr, et al. Neuroretinitis, aseptic meningitis, and lymphadenitis associated with *Bartonella (Rochalimaea) henselae* infection in immunocompetent patients and patients infected with human immunodeficiency virus type I. Clin Infect Dis 1995;21:352-60.
12. Reed JB, Scales DK, Wong MT, Lattuada CP Jr, Dolan MJ, Schwab IR. *Bartonella henselae* neuroretinitis in cat scratch disease. Diagnosis, management, and sequelae. Ophthalmology 1998;105:459-66.
13. Koehler JE, Relman DA. *Bartonella* species. In: Yu WL, Merigan TC Jr, Barriere SL, editors. Antimicrobial therapy and vaccines. Baltimore: Williams and Wilkins; 1999: 578-83.
14. Spach DH, Koehler JE. *Bartonella*-associated infections. Infect Dis Clin North Am 1998;12:137-55.
15. Anderson BE, Neuman MA. *Bartonella* spp as emerging human pathogens. Clin Microbiol Rev 1997;10:203-19.
16. McDonald HR, Schatz H, Johnson RN. Diagnostic and therapeutic challenges. Retina 1997;17:547-50.