

## Branch retinal artery occlusion secondary to *Bartonella henselae* infection in a 13 year-old



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### ABSTRACT

**Purpose:** To summarize the case of a 13 year-old boy diagnosed with a BRAO secondary to *B. henselae* infection. **Observations:** The patient presented with a sudden, unilateral, and painless scotoma. Fundoscopic findings and multimodal imaging were consistent with a BRAO with associated areas of intraretinal whitening along the involved artery. Upon further questioning, the patient reported having 15 cats at home. Antibodies were positive for *B. henselae*. The patient was treated with oral doxycycline 100 mg twice daily for 2 months with complete resolution of the retinal findings and the scotoma. **Conclusions and importance:** *B. henselae* should be considered as a potential cause of retinitis and BRAO, even in pediatric-aged patients.

### 1. Introduction

Within the realm of infectious disease, systemic conditions often include classic ocular manifestations as part of a comprehensive clinical picture. The organism *Bartonella henselae*, a gram-negative bacterium that is primarily spread to humans through the bites or scratches of cats, is widely known for its role in the development of cat-scratch disease (CSD).<sup>1</sup> While systemic disease is most often characterized by rapidly developing lymphadenopathy that follows exposure to the causative agent,<sup>2</sup> cases of ocular involvement are well-known and can include follicular conjunctivitis, focal chorioretinitis, retinal infiltrates, and neuroretinitis.<sup>3,4</sup>

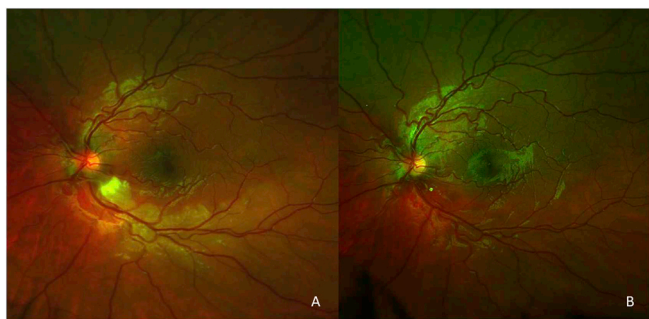
While many ocular processes have been directly traced to infection with *B. henselae*, our case focuses on the diagnosis and management of a BRAO that developed secondary to infection with this organism. An earlier work authored by Eiger-Moscovich et al.<sup>5</sup> reported 6 occurrences of BRAO secondary to *B. henselae* infection. Moreover, Oray et al.<sup>6</sup> discuss various ocular manifestations of CSD within 10 patients. Building on previously established ideas related to pathogenesis, our case offers a unique perspective on retinal involvement of CSD as our patient represents the youngest identified case of BRAO secondary to *B. henselae* infection.

### 2. Case report

A 13-year-old healthy white male presented with a history of an acute dark gray scotoma superiorly in his left eye beginning 1 day prior to presentation. The vision loss was not associated with pain, diplopia, or any other systemic complaints. Visual acuity was 20/20 OD and 20/25 -1 OS. Intraocular pressure, extraocular movements, and pupils were normal in both eyes. Slit lamp exam of the anterior segment was normal OU. Dilated fundus examination (Fig. 1A) was remarkable for an area of pallid retinal edema in a vascular distribution along the inferotemporal arcade OS with an adjacent superficial white lesion along the involved retinal artery. No intra-arterial plaque, retinal hemorrhage, or optic nerve swelling was observed. Spectral Domain Optical Coherence Tomography (SD-OCT) of the macula demonstrated inner retinal thickening (Fig. 2A) corresponding to areas of retinal whitening seen clinically. Fluorescein angiography showed delayed arteriovenous transit time through the inferotemporal arcade (Fig. 3). Based on these findings the patient was diagnosed with a BRAO OS with associated retinitis of unknown etiology.

The differential diagnosis of a unilateral BRAO in an otherwise healthy 13 year-old male is broad. Inflammatory, infectious, hematologic, and neoplastic etiologies were considered and a work up was

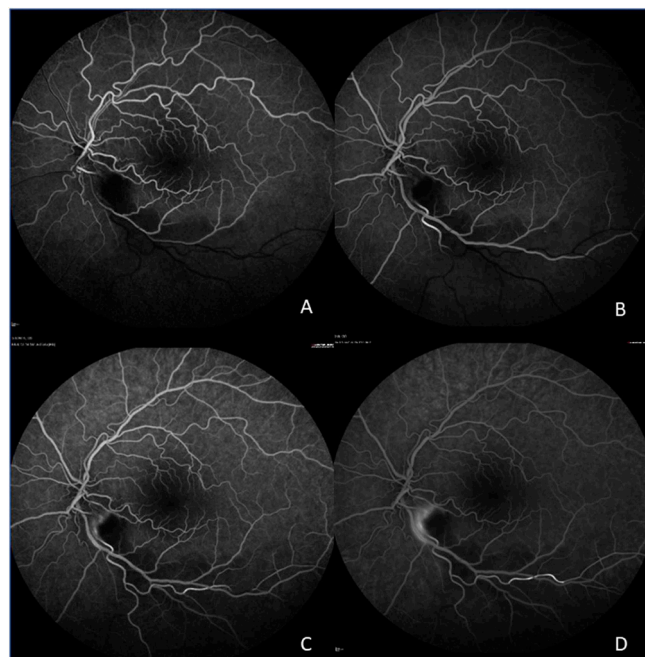
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**Fig. 1.** (A) Color fundus photo on presentation demonstrating a proximal BRAO involving the inferotemporal arcade associated with an area of focal retinitis and pallid retinal edema. (B) Resolution of the focal retinitis and pallid retinal edema four months after presentation. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

obtained via the patient's pediatrician (blood cultures, CBC, CMP, ESR, CRP, anti-DNA antibody, anti-phospholipid antibody panel, ANA, ANCA, homocysteine, protein C and S, antithrombin III, lysozyme, ACE, PPD, FTA-ABS, VDRL, and antibodies for Lyme disease, toxocariasis, toxoplasmosis, and *Bartonella henselae*). The patient was also referred for a chest x-ray and carotid ultrasound. The above work up was notable for significantly elevated *Bartonella henselae* antibody titers (IgG > 1:1024). Upon further questioning and after the positive result, the patient disclosed that he had 15 cats living in his home. Based on the exam, imaging, and lab results, the child was diagnosed with BRAO secondary to *Bartonella* associated retinitis and was started on oral doxycycline 100 mg BID.

Approximately two weeks after beginning treatment, the patient began to notice gradual improvement of visual symptoms. After four weeks of antibiotic therapy the patient reported improved vision nearing his baseline and measured 20/20 -1 OS. The area of focal retinitis slowly faded away on funduscopy. The area of inner retinal thickening present on SD-OCT slowly improved leaving an area of retinal thinning in the prior area of retinitis (Fig. 2). After two months of treatment, funduscopy showed complete resolution of focal retinitis

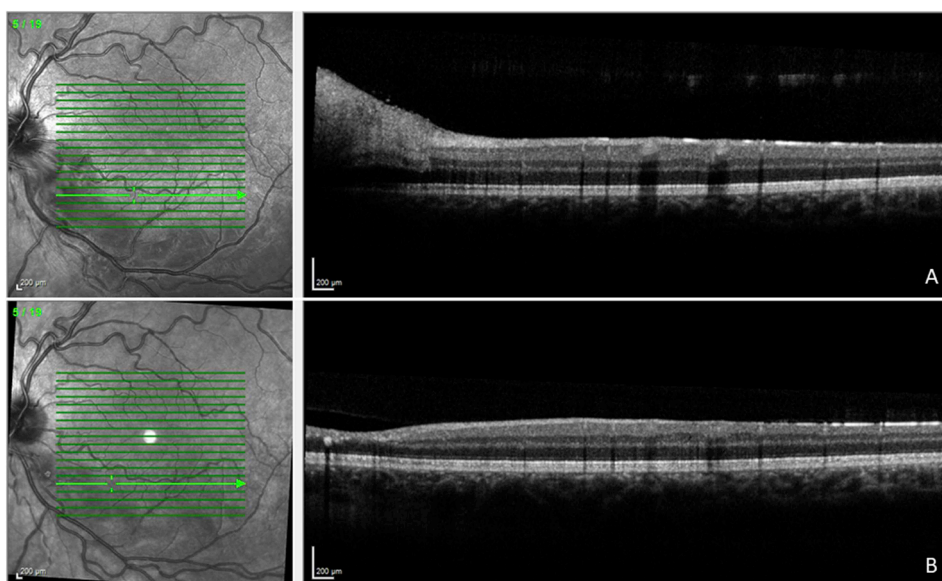


**Fig. 3.** Fluorescein angiogram at presentation. A (12 secs): Non-perfusion in the occluded ITA; B (24 secs): venous phase with complete filling along the STA and delayed filling along the ITA; C (90 secs): late staining of focal retinitis evident; D (5 mins & 15 secs).

(Fig. 1B). Doxycycline was discontinued and the patient remained symptom-free one month later.

### 3. Discussion

To our knowledge, our patient represents the youngest reported case of BRAO secondary to infection with the organism *Bartonella henselae*, an aerobic gram negative rod clinically associated with cat-scratch disease (CSD).<sup>3</sup> CSD is diagnosed on the basis of a history of exposure to cats typically with concurrent lymphadenopathy.<sup>2</sup>



**Fig. 2.** SD-OCT horizontal section demonstrating peripapillary retinal thickening through the site of retinitis at presentation (A) that evolves to an area of thinning 4 months later (B).

Serological detection of antibodies is standard to confirm presence of the causative agent.<sup>2</sup> The incidence of the disease is estimated around 4.7 in 100,000 within the US, and children between the ages of 5 and 9 are most likely to develop the condition.<sup>1</sup>

It is reported that ocular involvement occurs in 5–10% of patients with CSD<sup>4</sup> and most commonly presents as Parinaud oculoglandular syndrome.<sup>7</sup> Patients with this syndrome complain of a febrile illness accompanied by unilateral eye redness, foreign body sensation, and epiphora as well as regional lymphadenopathy.<sup>8</sup> Manifestations specific to the posterior segment are described by Roe et al.<sup>2</sup> and include neuroretinitis, chorioretinitis, and vascular occlusions among others. Neuroretinitis is the most common posterior segment complication; typically characterized as unilateral optic disc edema with ensuing macular star formation 2–4 weeks later.<sup>8</sup>

Our patient presented with a BRAO occurring distal to an area of focal retinitis. The etiologic mechanism for the occlusion is suspected to be from direct compression on the artery by the focus of retinitis.<sup>9</sup> *Bartonella* has also been described to invade vascular endothelium, which may contribute to the occlusion via stimulation of thrombogenic mediators.<sup>3</sup>

Treatment of *Bartonella* and its ocular manifestations is controversial since it is generally self limited in immunocompetent patients.<sup>6,8</sup> Treatment with doxycycline and erythromycin have been reported,<sup>6</sup> while doxycycline is preferred due to its superior ocular penetration.<sup>8</sup> Antimicrobials are generally recommended for immunocompromised individuals or those with severe ocular and/or systemic infections, even though the effectiveness of therapy has never been demonstrated in a controlled clinical trial.<sup>8</sup>

Specific to our patient's case, clearance of the focal retinitis and complete resolution of symptoms were noted after treatment with oral doxycycline. While Eiger-Moscovich et al.<sup>5</sup> were unable to clearly show a beneficial therapeutic effect with doxycycline (along with systemic steroids ± rifampin and ciprofloxacin) in their small case series of *Bartonella* associated BRAO, our case suggests the potential benefit of doxycycline alone in these cases. Further larger studies would be helpful to define management in this specific clinical scenario, although this is difficult in such a rare condition. Our case should alert clinicians to the possibility of *B. henselae* as a potential cause of retinitis and BRAO in patients, even young children.

### Summary statement

While cat-scratch disease is recognized as a systemic infectious process, ocular complications affect only 5–10% of patients. Herein, we

discuss the case of a 13 year-old male who presented with a branch retinal artery occlusion (BRAO) secondary to infection with *B. henselae*. To our knowledge, this is the youngest reported patient with this condition.

### Patient consent

None of the information presented above violates patient privacy and is HIPAA-compliant. Acknowledgments and Disclosures:

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### Authorship

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### Declaration of competing interest

None of the authors have any financial interests or potential conflicts to disclose.

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