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## Footnotes and Disclosure

The authors have no proprietary or commercial interest in any materials discussed in this article.

Written patient consent was obtained, and all patient identifiers were removed from the submission. Full adherence to the Declaration of Helsinki and all Federal and State laws.

## Murine typhus presenting as pseudotumor cerebri



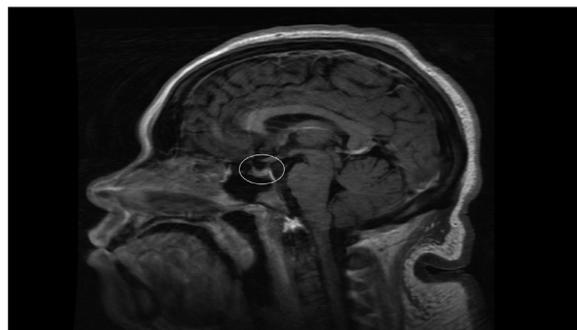
Murine typhus is an acute infection transmitted by rodent or cat fleas carrying gram-negative, obligate intracellular bacteria, *Rickettsia typhi*. This vector for transmission is most often carried on rodents, but opossums are thought to be a reservoir in suburban settings.<sup>1</sup> Associated with overcrowding, pollution, and poor hygiene, murine typhus has been documented worldwide, but the majority of cases in the United States are in Texas and California.<sup>2</sup>

Symptoms of murine typhus can be nonspecific, and they typically appear 7–14 days after infection. Patients most often present with recurrent fever, maculopapular rash, and headache, but arthralgia, cough, and abdominal pain can also be present.<sup>2,3</sup> Neurological symptoms are extremely rare, occurring in only 2%–5% of cases, and historically include altered mental status, seizures, or aseptic meningitis.<sup>3</sup>

We present a rare case of intracranial hypertension, papilledema, and visual disturbance secondary to *Rickettsia typhi* infection. To our knowledge, only three cases of this nature have been reported to date.

## Case Report

A 31-year-old African American woman presented with acute, painless, binocular loss of vision. She also had a ten day history of acute intractable vomiting with nausea, chills, recurrent fevers up to 103°F, neck stiffness, myalgias, diarrhea, and left-upper-quadrant abdominal pain. She reported headaches behind the left eye with radiation to the left occipital region, which was noticeably different from her usual migraine pattern. On examination, neck pain was elicited in the occipital area, but there was no neck stiffness or Brudzinski sign. Past medical history was significant for hypertension, diabetes mellitus type II, migraines, and



**Fig. 1—Sagittal T1 Fluid Attenuated Inversion Recovery (FLAIR) MRI of the brain showing a partially empty sella (encircled).**

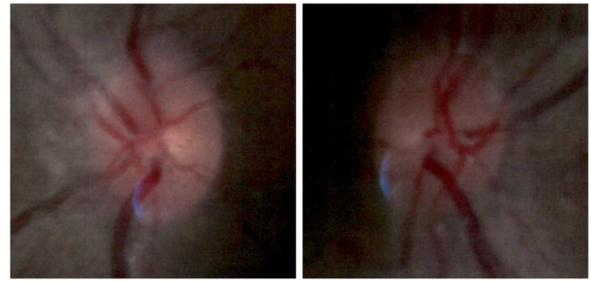
obesity (body mass index 34.3). She had no recent travel, animal exposure, or sick contacts.

Cranial magnetic resonance imaging (MRI) of the head and magnetic resonance venography with contrast were normal (Figs. 1 and 2). MRI of the spine was normal. Laboratory testing revealed an elevated C-reactive protein of



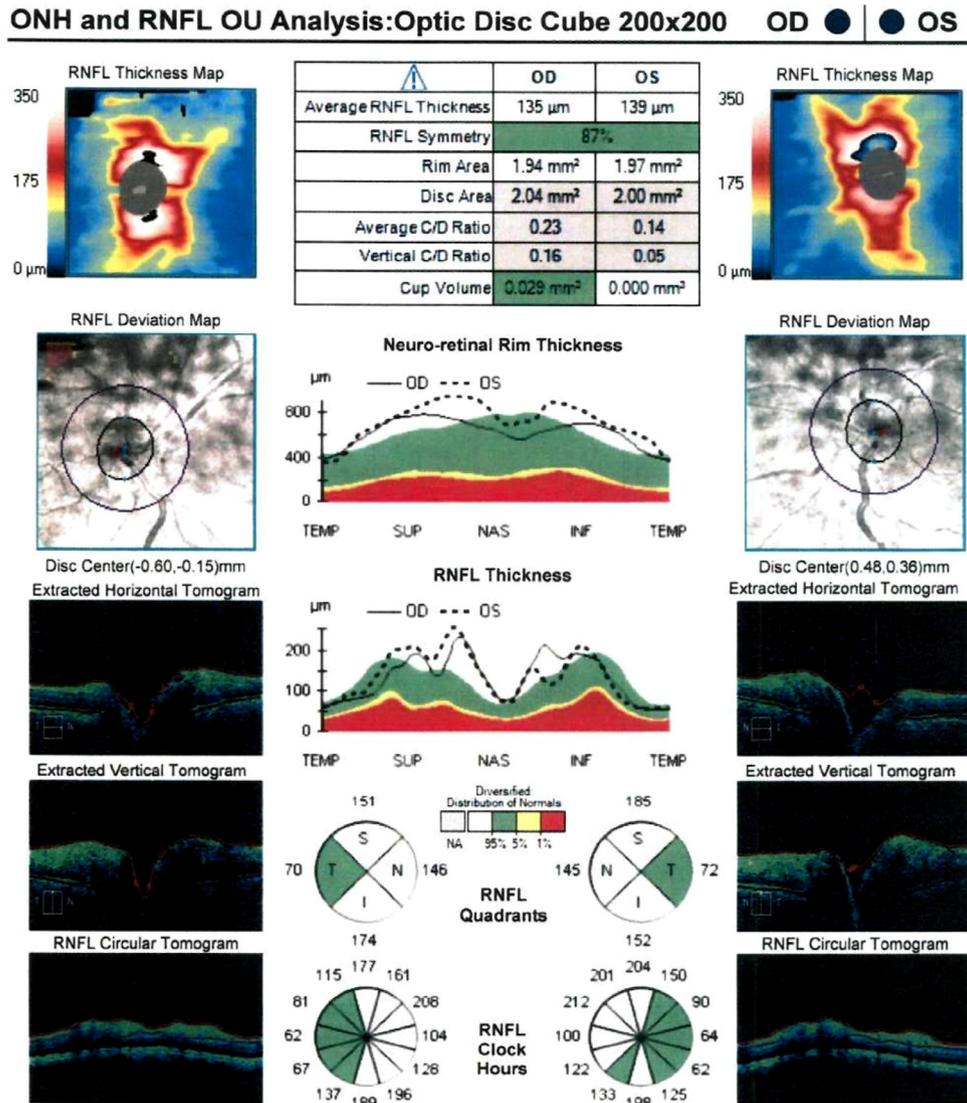
**Fig. 2—Axial T2 Fast Spin Echo (FSE) MRI of the brain showing lack of optic nerve tortuosity.**

19.96 (normal <8 mg/dL), an erythrocyte sedimentation rate of 27 mm/h (normal 0–20 mm/hr), and elevated liver enzymes (alkaline phosphatase of 410 U/L (normal 35–104 U/L), aspartate transaminase of 117 U/L (normal 10–35 U/L), and alanine transaminase of 126 U/L (normal 5–50 U/L). Blood and sputum cultures showed no growth. Lumbar puncture revealed an elevated opening pressure of 34 cmH<sub>2</sub>O (normal 7–18 cmH<sub>2</sub>O), but cerebrospinal fluid composition was normal. Ophthalmic examination showed visual acuity of 20/20 in the OD and OS. She had reactive pupils with no anisocoria or relative afferent pupillary defect. The anterior segment was within normal limits, and intraocular pressures were 15 OD and 16 OS. Automated perimetry 24-2 Humphrey visual field testing showed a superior arcuate defect and inferior nasal step OD and nonspecific scatter OS. Dilated fundus exam showed Frisen grade 1 disc edema bilaterally (OU) (Fig. 3), which was confirmed with optical coherence tomography (Fig. 4).



**Fig. 3—Fundus photos consistent with bilateral grade 1 disc edema.**

Diagnostic studies for Rickettsial IgG and IgM antibodies were elevated at IgG 1:1024 and IgM >1:1024 specific for *Rickettsia typhi*, and IgG 1:64 and IgM 1:256 for *Rickettsia rickettsii*. The patient was thus found to be positive for *Rickettsia typhi*. She was treated with acetazolamide 500 mg twice a day and doxycycline 100 mg twice a day with resolution of her symptoms.



**Fig. 4—Optical coherence tomography consistent with bilateral grade 1 disc edema.**

## Discussion

Murine typhus is uncommon but the prevalence may be rising<sup>1</sup>. To our knowledge, this is only the fourth case describing papilledema and pseudotumor cerebri secondary to *Rickettsia typhi* infection. Although the symptoms and signs may mimic idiopathic intracranial hypertension, patients with murine typhus have symptoms that are not related to increased intracranial pressure (e.g., fever, myalgias, and constitutional symptoms) and abnormal laboratory studies (e.g., elevated acute phase reactants and liver function studies).

Patients presenting with recurrent fever, headache, abdominal pain, and/or a rash should be evaluated for arthropod-borne illnesses, including murine typhus. Ophthalmologists should inquire about fever, rash, and stiff neck in cases of possible pseudotumor cerebri because the imaging and the cerebrospinal fluid, as in our case, can be consistent with idiopathic intracranial hypertension.

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## Cadaveric simulation improves ophthalmology resident confidence and preparedness for emergent ophthalmic procedures



Simulation-based training programs have become an essential tool in medical education.<sup>1</sup> Surgical simulation on platforms, including the Eyesi, which are now widely adopted throughout ophthalmology training, reduces intraoperative complication rates.<sup>2</sup> Even virtual training utilizing computer graphics and surgical models, which may be lacking in qualities provided by real-life scenarios or cadavers, helps trainees perform faster and with fewer errors compared with trainees who went without virtual training.<sup>3</sup>

The majority of ophthalmology residents complete a preliminary medicine or transitional year internship and therefore enter postgraduate year 2 (PGY-2) with limited surgical experience. Additionally, some ophthalmology residents struggle to acquire all of the necessary surgical skills for comprehensive surgical competence by graduation.<sup>4</sup> Residents often perform emergency procedures outside of clinic and may not be adequately prepared despite the use of virtual intraocular simulators and surgical curricula focusing on cataract surgery.<sup>2</sup> Lack of confidence regarding urgent surgical procedures may magnify stress and anxiety for residents when on-call and impact patient outcomes.

While boot camps, in-training surgical courses, and simulations have been shown to improve postgraduate medical trainees' clinical skills, knowledge, and confidence, they are not commonly utilized within ophthalmology education.<sup>1</sup> We designed a 1-day procedural simulation program, entitled Ophthalmology Olympics, consisting of didactics and a skills check-off, utilizing cadaver heads to improve resident confidence and preparedness for acute ophthalmology procedures often performed outside of routine clinic visits.

This study is Institutional Review Board approved, Health Insurance Portability and Accountability Act compliant, and adheres to the Declaration of Helinski. A procedural simulation course for ophthalmology residents and medical students was conducted annually. Trainees completed pre- and post-course surveys. Six procedures most commonly performed by ophthalmology trainees on an urgent basis were selected: retrobulbar injection, vitreous tap/inject, anterior chamber paracentesis, eyelid margin laceration repair, temporary tarsorrhaphy, and lateral canthotomy/cantholysis.

Ophthalmology Olympics included didactic sessions: faculty presented each procedure, described the clinical background (when to perform, how to evaluate patients prior to procedure, etc.), and described procedures step-by-step. Students were given several hours to practice in the cadaver laboratory with faculty supervision as well as near-peer teaching from upper-level residents and fellows. Vitreous tap/inject and anterior chamber paracentesis were