Headache as the Sole Presenting Complaint of *Toxoplasma Gondii* Infection

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INTRODUCTION

- Toxoplasmosis is a spectrum of clinical manifestations resulting from infection by the protozoa *Toxoplasma gondii*. Common manifestations include nonspecific, mild complaints through congenital disease, retinochoroiditis, encephalitis and/or meningitis, or a typhus-like exanthem with myocarditis .[1]
- Symptoms are dependent on disease manifestation.[2] Chronic, recurrent headaches, as opposed to those that are acute and isolated in nature, are positively linked to toxoplasmosis infection.[3]
- More than 40 million Americans are seropositive for *T. gondii*.[1] The worldwide prevalence of 30-50% is most closely correlated to gross domestic product per capita, moisture, and latitude.[2]
  - Persons at risk for infection include those living with/caring for cats, handling or eating raw/undercooked meats, and an immunocompromised state (HIV/AIDS, transplant recipients, cancer).[2]
  - Immunocompromise is the biggest risk factor for severe disease manifestations.[2]
- Diagnosis depends on presentation. Treatment includes IV antibiotics and other disease specific support.[1]
- Toxoplasmosis has been correlated to the following body systems, in order of descending strength: musculoskeletal, neurological, immune, metabolic, respiratory, allergic, digestive, and mental health disorders.[4] See table 1.

Table 1. Toxoplasmosis Association with Disease/Disorder[2,4]

Pertussis	Cardiovascular disease	Asthma
STIs	Perinatal conditions	Congenital anomalies
Epilepsy	Endocrine disorders	Neurocognitive disorders
Suicides	Traffic accidents	Psychiatric disorders
Cancer (prostate, mouth/oropharynx, leukemia)		

CASE DESCRIPTION

Chief Complaint:
28 year old Caucasian male complaining of a headache (HA) for 1 day.

HPI:
Unilateral, non-exertional HA with an onset of ~1 hour that is of throbbing quality to the right forehead/periorbital area with 7/10 severity.

PMH/PSH:
Hemorrhoids, left tibula-fibula ORIF

Meds:
None

Allergies:
Amoxicillin, Oxycodone-Acetaminophen

FH:
Unremarkable

Social H:
Lives with wife and 2 cats (recently sick).
Works as a director of education.
Sexually active with wife.
Social drinker. Denies IV drug use.

ROS:
Positive for: difficulty sleeping, vertigo, photophobia, phonophobia, nausea, and vomiting.
Negative for: recent illness, travel, or sick contacts, rash, trauma, nuchal rigidity, and focal deficits.

Physical Exam:
BP: 123/83 mmHg T: 97.9 F SpO2: 99% RA
HR: 70 bpm RR: 16 bpm
Height: deferred Weight: 103 kg

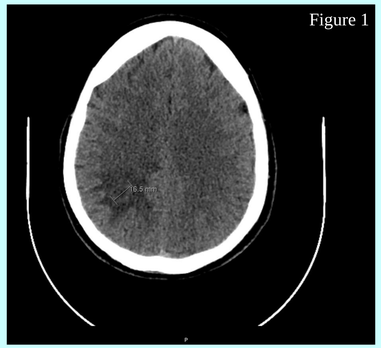
General: Distressed but non-toxic appearing male lying in position of comfort with knees and hips flexed. Pleasant, cooperative.

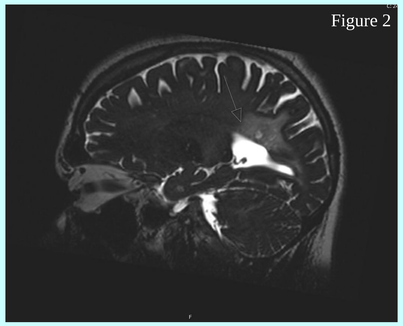
Skin: Warm, dry, no rashes.

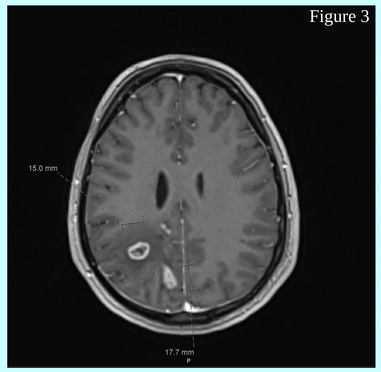
HEENT: Normocephalic, atraumatic. Neck supple; no tenderness to cervical spinous processes. Non-injected conjunctiva, no papilledema. Moist mucous membranes. Light grey tympanic membranes.

Lungs/Heart/Abdomen/MSK: Unremarkable.

Neuro: AOx4. Intact CMS x4 extremities. CNIII-XII intact. Left temporal hemianopsia. Visual acuity not tested. Negative Kernig's and Brudzinski's signs. Good attention, insight, and judgment.







Emergency Department Workup
CT Head (Figure 1):
1.7 cm right parietal lobe lesion with perilesional edema

MRI Brain (Figure 2, 3):
Multiple enhancing parenchymal lesions and parenchymal loss: 1.5 cm ring enhancing posterior parietal lobe lesion and 1.8 cm flame shaped lesion in right occipital lobe

LP with CSF Analysis:
Colorless, clear, no xanthochromia
RBC = 0, glucose = 61, protein = 39
Negative for: cryptococcus, histoplasma, coccidiodes, bacterial culture, toxoplasma IgG

CT chest, abdomen, pelvis:
Negative for acute pathology

Labs:
CBC, CMP, coags WNL
T. Gondii DNA –
ANA and Lupus –
HIV - , CD4+ 318, CD8+ 534
HSV1 -, HSV2 –
Quantiferon Gold –

Case Outcome:
The patient was empirically started on IV trimethoprim/sulfamethoxazole. He was admitted to the internal medicine floor where he had spontaneous resolution of his visual field deficit, improving headaches with decreasing pharmacological management, and follow-up MRI consistent with decreased perilesional edema. Per patient preference, transfer of care was given to a nearby hospital on day 5 with brain biopsy planned.

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DISCUSSION

- Despite the correlation of recurrent headaches with *T. gondii* infection, clinicians must be prepared to efficiently identify the infection with presentations that may not have been previously implicated in toxoplasmosis in order to limit neurological sequelae.[3, 5]
- Prevention, screening, and prophylactic treatment for all persons predicted to have *T. gondii* infection is an impracticality.
  - Prevention with lifestyle modification, including proper handling/cooking of meat, good hand hygiene, limiting exposure to cat litter while pregnant, and safe needle use, is necessary for all patients.[6]
  - Vaccination research is promising for all persons at risk for T. gondii infection. It is focused on the SAG1 surface antigen and the rhoptry antigen, an organelle pertinent for protozoa motility and hence, survival.[7,8]
  - Screening and prophylactic treatment are limited to high-risk populations – persons with HIV/AIDS or cancer, and transplant recipients – at sites where appropriate diagnostic techniques and treatment can be managed.[9,10] Specifically, patients with a CD4 count <100/mm should receive prophylactic treatment.[6]
  - Evidence on screening/prophylactic treatment for pregnant females with *T. gondii* is controversial and depends on the clinician's judgment.[6,11,12]

CONCLUSIONS

- Toxoplasmosis is an underrated public health problem to always consider in a differential diagnosis, as it is implicated in numerous diseases, has a high worldwide prevalence, and presents with a wide range of clinical manifestations, some of which may be well recognized and others which may be newly emerging.
- Difficulty in recognizing toxoplasmosis but capability in diagnosing and treating the infection means providers must rely on adequate prevention, screening, and prophylactic treatment.
- Prevention, screening, and prophylactic treatment are guided towards individuals most at risk for toxoplasmosis, including those with HIV/AIDS or cancer, transplant recipients, and some pregnant females.