Abstract Title
Irreversible severe vision loss associated with acute quinine sulfate optic neuropathy

Abstract
A patient presents with NLP vision due to acute quinine sulfate optic neuropathy. This case discusses characteristic signs, expected physiological changes, and expected visual outcomes associated with acute toxicity.

I. Case history
• Patient demographic
  o 79 year old Caucasian male
• Chief complaint
  o Patient reports that back in 1992 he was taking left over quinine sulfate medications for leg cramps which was prescribed for his father. He experienced signs of cinchonism (stomach upset and vomiting 2-3 times) after taking quinine sulfate. After 2 days he woke up in the morning with only peripheral light perception before vision slowly declined to no light perception.
• Ocular history
  o Longstanding end stage quinine sulfate toxicity OU since 1992
  o Macular scar OS>OD of unknown etiology
  o Diabetes without retinopathy OU
  o Lattice degeneration OD
  o Moderate cataracts OU
  o Blepharitis and dry eye OU
  o History of right orbital fracture with no globe rupture, retrobulbar compartment syndrome, detachments, or commotio retinae in 2013
  o History of chronic headaches with exacerbation, negative temporal artery biopsy
• Medical history
  o Osteoporosis
  o Graves’ disease
  o Chronic obstructive lung disease
  o Sleep apnea
  o Positive purified protein derivative test
  o Occlusion and stenosis of left carotid artery without cerebral infarction
  o Status post left carotid endarterectomy
  o Coronary artery disease
  o Status post coronary artery bypass grafting
  o Gastroesophageal reflux disease
  o Transient ischemic attack
  o Diabetes mellitus type 2, with neuropathy
  o Hypertension
  o Degenerative joint disease
• Medications
  o Albuterol
  o Aspirin 325mg
Dextrose  
Diphenhydramine  
Etodolac  
Gabapentin  
Lisinopril  
Metformin  
Methimazole  
Omeprazole  
Salsalate  
Simvastatin

**II. Pertinent findings**

- **Clinical:**
  - Best corrected visual acuity: no light perception OD and OS
  - Pupils: non reactive mid dilated pupils OD and OS
  - Posterior segment: OD 0.4 cup to disc ratio with pallor, significant attenuation of arteries, moderate macular mottling with 1/2DD area of chorioretinal atrophy. Previous macular edema noted secondary to trauma, appears resolved. OS 0.4 cup to disc ratio with pallor, significant attenuation of arteries, moderate macular mottling with 1DD area of chorioretinal atrophy slightly temporal to macula.

- **OCT 5 line raster:**
  - Questionable RNFL thinning OU, good reliability.
  - 5 line raster done in place of RNFL and macular scans because of poor fixation due to NLP OU.

- **Fundus photos:**
  - Comparison of photos from 2012 to images taken in 2015, chorioretinal macular atrophy OS appears stable, chorioretinal macular atrophy OD was not present in 2012 photos.

- **Labs:**
  - Fluorescent anti nuclear antibody: positive titer
  - Erythrocyte sedimentation rate: 35 mm/hr (normal for age)
  - Thiamine: 2.8 Ug/dL (normal)
  - TSH: 1.9 mIU/ml (normal)
  - Vitamin B12: 674 Pg/mL (normal)
  - Lead whole blood: 1.9 Ug/dL (normal)
  - Temporal artery biopsy: negative

**III. Differential diagnosis**

- **Primary:** quinine sulfate (toxic) optic neuropathy OU
- **Others:** optic nerve compression or malignancy, giant cell arteritis, papilledema, Leber’s hereditary optic neuropathy, central retinal artery occlusion

**IV. Diagnosis and discussion**

Quinine sulfate (Qualaquin) is used to treat malaria. In the past, it has also been used to treat restless leg syndrome and nocturnal leg cramps. Because of its narrow therapeutic range and high risk of side effects, the US Food and Drug Administration restricted its use to solely...
treatment of malaria in 2007. Most symptoms of overdose occur after dosages greater than 3 grams, but can vary based on sensitivity to the drug. Death can occur at dosages exceeding 8 grams. Common signs of overdose are cinchonism (headache, vomiting, dizziness etc), hypoglycemia, arrhythmias, and visual disturbances. In this case the exact amount taken by the patient is unknown since the medication was not prescribed for him. Normal dosages of quinine sulfate for treatment of nocturnal leg cramps can range from 200-300mg in a 24-hour period, indicating that the patient must have taken a dosage nearing 3 grams or 10+ pills to have experienced symptoms of vomiting after 2 days of self-medication. Most toxic optic neuropathies are due to prolonged exposure and ocular signs are gradual in onset. The signs often improve after removal of the offending agent. But this case highlights the devastating effects of acute toxic optic neuropathy over a 2-day period. Studies have shown that vision loss often occurs 10-24 hours after ingestion of a toxic dose of quinine sulfate with initial presentation being mid dilated pupils, normal optic nerve appearance, normal vasculature, and a “cherry red spot” accompanied by inner retinal edema. Late stage findings of quinine toxicity include attenuated vessels and optic nerve pallor starting 1-2 months after initial onset. Some theories attribute vision loss to acute retinal vasoconstriction and subsequent ischemia. However, fluorescein angiography studies showed that despite significant arteriolar narrowing in the late stages of the condition, there were no signs of abnormalities in arteriovenous transit and retinal perfusion, thus ruling out acute ischemia as the cause of vision loss. Other theories attribute vision loss to toxicity of the neuroretina. Electrophysiology findings support this theory indicating that there is damage to mainly inner retinal layers. Electroretinography revealed delayed B-waves with relatively normal amplitudes while electrooculography findings were grossly reduced from >250% in normals to 130%. To further support inner retinal layer loss, optical coherence tomography findings of late stage cases show a significant thinning of inner retinal layers; specifically the nerve fiber layers and ganglion cell layers with photoreceptor layers largely intact.

V. Treatment and management

The patient’s initial presentation was already no light perception. In this case of prolonged severe loss, there was nothing that could be done to regenerate the retina that had been damaged. Discontinuation of the toxic substance is often the first and possibly only step in management of quinine sulfate toxicity. In the case of our patient, he was only on the medication 2 days before he discontinued use. The patient was referred for low vision rehabilitation for orientation and mobility training and also to learn skills to aid in activities of daily living.

Previously, stellate ganglion blockage had been proposed as a possible treatment option for quinine sulfate optic neuropathy. This is because one of the theories regarding the etiology of quinine sulfate optic neuropathy is related to retinal vasoconstriction. However, review of the literature reveals that there is minimal likelihood of regaining vision and many associated side effects which make stellate ganglion blockage a poor treatment for this condition. Most cases show an initial loss of vision with a return of central vision to 20/20 levels along with a persistent mild blue/yellow color vision deficiency dependent on the initial severity of damage. Removal of the offending stimulus is advised along with monitoring.

VI. Conclusion

It is important to properly educate patients on the adverse side effects of quinine sulfate toxicity, as overdose can lead to devastating and potentially irreversible vision loss.
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Available images:
- Fundus photos OD and OS
- OCT HD 5 line raster of ONH OD and OS

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Bibliography:
11. "Quinine Sulfate Tablets BP 200mg." Emc.