

# High Risk Medications and Neuro-Ophthalmic Challenges

1 hour

Kelsey Moody Mileski, OD, FAAO

## Course Description:

Systemic medications and procedures can have significant impacts on both the central nervous system and ocular structures. From a neuro-ophthalmic standpoint optic nerve swelling, diplopia and nystagmus are the most common findings seen. In this course we will discuss different medications and their impact on the visual system from a neuro-ophthalmic standpoint.

## Objectives:

- Identify medications that increase the risk of optic nerve disorders
- Differentiate which medications may result in diplopia or nystagmus
- Apply a thorough history and work-up for patients with medication induced ocular side effects

## OUTLINE:

### I. Overview

- a. Many systemic medications may impact the ocular tissue and central nervous system
- b. Importance of staying up to date on literature as new medications are released
- c. Importance of thorough history with patient including current and recent medications utilized

### II. Swollen optic nerves

- a. Amiodarone
  - i. Controversial as patients on this medication often have similar risk profile for NA-AION
  - ii. Typically bilateral but may be asymmetric
  - iii. Slow, progressive visual loss with disc edema
  - iv. Typically improves with discontinuation
    1. Disc edema can persist for several months due to long half life
- b. GLP-1 agonists
  - i. Controversial with studies showing different results
    1. 3 retrospective studies performed
      - a. 2 show associated risk and 1 does
        - i. The study that had no associated risk only had Caucasian patients

2. Findings can occur in patients treated with these medications with and without diabetes
  3. Seems more likely to occur the longer patients are on the medication
- c. Phosphodiesterase inhibitors
    - i. Controversial association with NA-AION
    - ii. Felt to occur due to hypotensive event
    - iii. May be impactful in terms of timing of medication
  - d. TNF- $\alpha$ 
    - i. Used to treat inflammatory disorders
    - ii. Increases risk of optic neuritis however remains controversial as the inflammatory conditions being treated could also be implicated
  - e. Tetracyclines
    - i. Can be utilized for antimicrobial or anti-inflammatory properties
    - ii. Can cause papilledema
    - iii. Mechanism is thought to be secondary to decreased CSF absorption
    - iv. Discontinuation of the medication typically resolves the condition
  - f. Vitamin-A derivatives
    - i. Similar to tetracyclines can cause papilledema/IIH- like syndrome
    - ii. Typically resolves with discontinuation of the medication
  - g. Immune checkpoint inhibitors
    - i. Typically utilized in targeted cancer therapy
    - ii. Posterior uveitis + disc edema commonly seen
    - iii. Other ocular findings possible:
      1. Optic neuritis
      2. Diplopia
    - iv. Typically resolves with discontinuation of the medication

### III. Optic atrophy

- a. Ethambutol
  - i. Antibiotic used in mycobacterial infections
  - ii. Bilateral progressive loss of central vision
  - iii. Typically occurs between 2-8 months after starting medication
  - iv. Mild improvement with discontinuation of medication
- b. Gastric bypass
  - i. Although not a medication – can lead towards vitamin deficiencies
  - ii. Can cause a toxic optic neuropathy and if severe enough Wernicke's

### IV. Diplopia/Nystagmus

- a. Statin-medications
  - i. Common cholesterol medication
  - ii. Multiple case reports that they may exacerbate or lead to the diagnosis of myasthenia gravis
  - iii. Typically occurs within the first 6 months of starting the medication

- b. Carbamazepine
  - i. Anti-convulsant used to treat epilepsy, bipolar disorder, trigeminal neuralgia
  - ii. Can occur at therapeutic levels but also with toxicity
  - iii. Can cause diplopia and nystagmus
- c. Depakote
  - i. Anti-epileptic medication
  - ii. High levels in serum can result in diplopia and nystagmus
- d. Opioid withdrawal
  - i. Typically causes esotropia
  - ii. While on opioid's pupils are typically small and accommodation may be stimulated. When opioids are rapidly removed the visual system may be unable to compensate leading to a consecutive esotropia
  - iii.

**V. Medications utilized in neurologic disorders**

- a. Topiramate
  - i. Utilized in seizure, idiopathic intracranial hypertension and migraine disorders
  - ii. Can cause induced myopia and angle closure glaucoma
    - 1. Increased permeability of choroid causing choroidal effusion and ciliary body swelling
- b. Fingolimod
  - i. Immunomodulating medication used to treat multiple sclerosis
  - ii. Low risk of macular edema

**VI. Q&A / Discussion**