

Ocular Side Effects of Systemic Medications

(1 Hour)

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Abstract

Even when taken properly, certain systemic medications have the ability to cause ocular side effects. This course will highlight several systemic drugs that can result in ocular complications. Clinical presentation, diagnosis, and management of the ocular complications will be discussed.

Learning Objectives

- 1) To educate the primary care optometrist about popular systemic medications that can result in ocular side effects.
- 2) To understand the clinical presentation of ocular side effects caused by certain systemic medications.
- 3) To enable the primary care optometrist to effectively communicate with other health professionals when ocular side effects of systemic medications are encountered.

Outline

- I. Introduction
 - a. Importance of a thorough ocular history, review of medications
 - i. 55% of Americans regularly take a prescription medication (Consumer Reports, Sept 2017)
 1. Those who use prescriptions take on average, 4 medications
 2. Often prescribed by more than one health care provider
 - ii. Over the counter products
 - b. In 2014, nearly 1.3 million people sought emergency room treatment for adverse drug effects; 124,000 deaths
- II. A Case of Anxious Anisocoria

- a. Case presentation - 14yo WF, tripped and fell at basketball practice 2 days prior, coach noticed left pupil was fully dilated. Pt was sent to ER – CT was normal. Pt had been to 2 other ophthalmologists, still no answer why pupil was dilated. Pt denies vision changes.
 - b. Qbrexa (glycopyrronium)
 - i. First and only FDA approved (2018) topical anticholinergic cloth towelette, used once daily on underarm area
 - 1. Anticholinergic agents inhibit parasympathetic nervous system by selectively blocking the binding of Ach to its receptor in nerve cells
 - ii. Approved for patients 9 and older with primary axillary hyperhidrosis
 - iii. Ocular adverse reactions: Mydriasis (6.8%), blurred vision (3.5%)
 - iv. Management: self-resolved
- III. A Curious Case of Conjunctivitis
- a. Case presentation – 37yo BM, bilateral red/painful eyes x 2 days, +photophobia, +tearing, +itching, +blur. Denies any recent URI, exposure to red eye. Clinical examination revealed diffuse injection, chemosis, serous discharge, subepithelial infiltrates, follicles. Adenovirus negative on in-office lab testing.
 - b. Dupixent (dupilumab)
 - i. FDA approved 2017 for treatment of moderate to severe eczema (atopic dermatitis)
 - 1. Inhibits overactive signaling of two key proteins, IL-4 and IL-13, which are believed to be major drivers of the persistent underlying inflammation in atopic dermatitis
 - ii. Subcutaneous injection q2 weeks
 - 1. Pt recently started medication 4 weeks prior, red eyes began shortly after 2nd dose/injection
 - iii. Ocular adverse reaction: conjunctivitis (CHRONOS, SOLO, CAFÉ studies)
 - iv. Management: topical steroids, cold compresses, preservative-free artificial tears
 - v. Literature on demodex and dupilumab
- IV. Spotlight on semaglutide

- a. GLP-1 receptor agonists mimic GLP-1 hormone (semaglutide, liraglutide, tirzepatide)
 - i. Slow gastric emptying
 - ii. Promotes satiety
 - b. Ocular side effects
 - i. Vision/refraction
 - ii. NAION
 - iii. Worsening of diabetic retinopathy
 - iv. AMD – an emerging area of interest
 - c. There is currently no established screening protocol upon GLP-1 initiation
 - i. Recommendations: communicate with PCP and endocrinologists regarding retinal health and severity of any existing diabetic retinopathy, monitor closely for signs of diabetic retinopathy, NAION, and initiate timely referrals for suspected ocular complications
- V. Updates on Hydroxychloroquine (Plaquenil)
- a. Updated 2025 AAO recommendations
 - i. Initial baseline exam with DFE (including OCT and wide-field FAF) is advised soon after beginning medication, then annual screenings are advised but may be deferred during first 5 years if there are no significant risk factors
 - 1. Screening:
 - a. Regular exams with DFE
 - b. Optical coherence tomography (OCT)
 - i. Evaluate both parafoveal and pericentral areas for focal thinning of ellipsoid zone
 - ii. Monitor for quantitative macular thinning – may be visible before ellipsoid zone changes are apparent
 - c. Wide-field Fundus autofluorescence (FAF)
 - d. Adjunct tests (not primary screening tools): Automated VF and multifocal electroretinography (mfERG)
 - i. Newer VF algorithms such as 24-2C can screen both parafoveal and pericentral regions
 - ii. Risk factors:

1. High dose >5.0mg/kg/day or duration >5 years
 2. Age >60
 3. Significant kidney disease
 4. Concomitant use of tamoxifen
 5. Pre-existing macular disease
- b. Case presentation: 84 yo WF, has been taking Plaquenil 200mg BID x 19 years for lupus. Current weight 185lb. Current height 5'3". Visual acuity 20/20 OD 20/30 OS. Pt is pseudophakic. VF, OCT, fundus photos show evidence of plaquenil toxicity. Confirmed by retina specialist and communication with rheumatologist. Pt was instructed to d/c Plaquenil.
- VI. If you or a loved one are experiencing vision loss....call me
- a. Elmiron (pentosane polysulfate sodium)
 - i. FDA approved 1996 to treat painful bladder syndrome (interstitial cystitis). Protects bladder walls from irritants in the urine, relieving pain and discomfort.
 - ii. Recent reports linking to pigmentary maculopathy
 1. 2019 – American Academy Ophthalmology presentation - 91 patients who had taken average of over 5000 pills each for 15 years. 22 out of 91 patients showed signs of drug toxicity.
 2. 2020 – study of 117 patients who took Elimiron, 27 had signs of maculopathy. Those patients who took >1500 grams had highest toxicity rate
 3. Prior to 2020, prescribing information did not list warning about drug's associated risk to pigmentary maculopathy
 - iii. Ocular complaints: may have fairly normal, or 20/20 acuity ranging to severe disability. Subjective complaints include trouble reading, adjusting to dim lighting, glare, and blind spots.
 - iv. Imaging (fundus photography, OCT, FAF): bilateral maculopathy involving optic disc and posterior pole. Widespread RPE/photoreceptor loss extending beyond macula to periphery.
 - v. Ocular effects can continue after drug has been stopped
 - vi. Baseline screening exam – color photos, FAF imaging, OCT, then annually after 5 years on medication

1. Caution starting drug in patients with underlying or pre-existing macular disease

VII. ME....in MS

- a. Gilenya (fingolimod)
 - i. FDA approved 2010; 1st oral disease modifying treatment for relapsing forms of multiple sclerosis in patients age 10+ (reduces frequency of clinical exacerbations, delay accumulation of physical disability)
 - ii. Sphingosine 1-phosphate receptor modulator
 - iii. Blocks lymphocyte leakage from lymph nodes
 - iv. Typical dose 0.5mg cap QD
- b. Ocular adverse reaction: blurry vision (4%), macular edema (1.5% - 1.25mg dose; 0.5% - 0.5mg dose) with or without symptoms generally within 3-4 months of starting treatment
 - i. Increased risk in patients with diabetes or history of uveitis (20%)
 - ii. "FAME" – fingolimod-associated macular edema
- c. Recommended management: baseline eye exam/OCT prior to starting treatment, then 3-4 months later. Macular edema resolves/improves if d/c medication (up to 6mo for resolution). ?? benefit from topical NSAIDs/steroids.
- d. Other systemic medications that have been linked to macular edema: acetazolamide, thiazolidinediones, taxanes, tamoxifen, niacin, interferons, sildenafil/tadalafil, etc.

VIII. Long COVID strikes again

- a. Case presentation of ethambutol toxicity in a 68 year old patient suffering MAC infection post-COVID
- b. Ethambutol
 - i. Treatment for mycobacterium avium complex and tuberculosis
 - ii. Toxicity rate increases based on dosage, typically within first 3-5 months of use
 1. Prevalence is 1-2%
 2. Signs and Symptoms: decreased visual acuity, dyschromatopsia, visual field defects, retrobulbar optic neuritis
 3. Risk factors: dose, age, kidney problems

- iii. Baseline evaluation should include: VA, color vision, contrast sensitivity, visual field testing, OCT and VEP if available. Pt should be monitored closely while on medication and medication should be discontinued if toxicity is suspected.
- iv. Patient case shows improvement in visual acuity noted over several months.