Sleep Disorders and the Eye

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- Obstructive sleep apnea
- Nocturnal lagophthalmos
- Circadian rhythm disorders in blindness
Obstructive Sleep Apnea – associated eye diseases

- Repetitive episodes of upper airway occlusion during sleep combined with symptoms, most commonly excessive daytime sleepiness.
- Increased prevalence due to obesity, increased awareness
- Risk factor for HTN, CV disease
- Polysomnography necessary for diagnosis
Obstructive Sleep Apnea – Symptoms and Signs

- Snoring
- Excessive daytime sleepiness or fatigue
- Witnessed apneas by a bed partner
- Morning headaches
- Waking up choking or short of breath
- Insomnia

- Obesity
- High Mallampati classification
- Large neck circumference (men, >17 in; women, >16 in)
- Tonsillar hypertrophy
- Retrognathia
Associated Ophthalmic Conditions

- Floppy eyelid syndrome
- Primary open-angle glaucoma (POAG)
- Normal-tension glaucoma (NTG)
- Non-arteritic anterior ischemic optic neuropathy (NAION)
- Papilledema
- CPAP treatment-associated eye complications
Floppy Eyelid Syndrome

- easily everted floppy eyelids and papillary conjunctivitis
- Symptoms: watering, stickiness, discomfort, blurred vision
Floppy Eyelid Syndrome

- Signs:
  - Rubbery, floppy, and easily everted eyelids
  - Mild ptosis, downward pointing eyelashes, or inversion
  - Corneal involvement
  - Keratoconus
  - Infectious keratitis have also been described
Pathophysiology

- Mechanical stress
- Tissue inflammation secondary to alternating ischemia and reperfusion
- Increased blood leptin levels correlating with body mass index
Treatment

- Weight loss
- Treatment of OSA
- Eye shields, lubricants
- Surgical tightening of eyelids
Glaucoma

- Progressive optic neuropathy
- Optic disc cupping with visual field loss
- OSA linked to Primary Open Angle Glaucoma
Healthy Optic Nerve

Optic Nerve in Eye with Glaucoma

Normal visual field

Severe damage from glaucoma
Glaucoma

- Risk factors:
  - Increased age
  - FHx
  - Thin cornea
  - High intraocular pressure
Pathophysiology

- Increase in IOP
- Ischemia
Treatment

- Topical therapy
- Laser
- Surgery
- CPAP treatment in patients with OSA and POAG
Nonarteritic Anterior Ischemic Optic Neuropathy

- Most common cause of acute optic neuropathy >50yrs
- Sudden painless onset of unilateral visual loss
- Usually noticed on awakening
- Irreversible
Signs

- RAPD
- Disc edema
- Altitudinal defect on visual field testing
Risk factors

- >50 yrs
- Small cup to disc ratio
- HTN
- DM
- Hypercholesterolemia
Risk Factors

Do Erectile Dysfunction (ED) Drugs Really Cause Vision Loss?
Pathogenesis

- Vasculopathic occlusion
- Decreased blood flow in the optic disc microvasculature
- Nocturnal hypotension and hypoxia
Link to OSA

- Risk ratio was 4.9 in patients with OSA compared to the general population
- OSA was 2X more frequent than HTN or DM
Proposed mechanisms

- Impaired ON head blood flow due to apneic episodes
- Apnea-induced blood pressure variations
- Imbalance between nitric oxide and endothelin
- Increased ICP causing direct compression or impaired circulation
Treatment

- None
- Modification of risk factors
Papilledema

- Bilateral optic disc swelling due to increased ICP
- Seen in space-occupying lesions, obstructive hydrocephalus
- Mechanical disruption of axoplasmic flow within optic nerve
- Symptoms: headache, nausea, pulsatile tinnitus, TVO’s
Papilledema and OSA

- Not a frequent sign in OSA
- ICP increases during sleep correlating with apneic events
Treatment

- Rule out all other causes
- Acetazolamide
- Improvement with CPAP reported
CPAP related eye complications

- Dry eye
- Bacterial conjunctivitis
- Corneal ulcers

Pathophysiology:
- Air blowing into the eye
- Retrograde movement of air and mucus from the nasal passage through the NLD and into the eye
Nocturnal Lagophthalmos

- Inability to fully close eyelids
- Symptoms:
  - Irritation
  - Dryness
  - Epiphoria
- Signs
  - Superficial punctate corneal staining
  - Corneal scarring
Nocturnal Lagophthalmos

- Risk factors
  - Neurogenic conditions
  - TED
  - Myopathies
  - Botox
  - Excessive alcohol intake
- Treatment
  - Ocular lubricants
Circadian Rhythm Disorders of the Blind

- Sleep-wake cycle – most apparent circadian rhythm in humans
- Environmental cues:
  - Light
  - Melatonin
  - Physical activity
  - Meal times
  - Temperature
- Supra-chiasmatic nucleus: master circadian clock in the body
- Regulates the secretion of melatonin from the pineal gland
- Optic pathways exist from the retina to the SC nucleus
Blindness: irregular circadian rhythm due to absence of light synchronization

Consequences:
- Sleep disturbances (insomnia; daytime sleepiness)

Treatment:
- Timed melatonin
Conclusion

- Important to recognize associations.
- Routine eye exam for patients with OSA to rule out glaucoma.
- Consider OSA in patients with floppy eyelid syndrome, NAION and papilledema if no other apparent cause.
- Take a sleep history in blind patients and refer as necessary for management.
References


Thank you!