Wake Up – Sleep Disorders and Eye Care

Alexander Golbin, MD, PhD
Diplomat of the American Board of Sleep Medicine
Sleep & Behavior Medicine Institute
707 Lake Cook Road, suite 118
Deerfield, IL 60015
www.chicagoshmi.com
Frontdesk@chicago.sbmi.com
847-984-6585

Stuart Richer, OD, MSc, PhD, FAAO
Director Ocular Preventive Medicine and Optometric Residency Program
Captain James A Lovell Federal Health Care Center
Optometry / Eye Clinic 112e
3001 Green Bay Rd
North Chicago, IL 60064
Stuart.richer1@VA.gov
224-610-7145

Abstract

Restful and rejuvenating sleep plays a pivotal and under-appreciated role in a systemic health as well as a range of eye conditions. The clinical implications and profile of undiagnosed obstructive sleep apnea syndrome (OSAS) and its’ differential diagnosis are discussed. Besides preventing disease, good sleep is the foundation of high alertness and attention, good mood, high-quality performance and sharp vision.
Objectives

1) Briefly review how sleep medicine intersects with virtually all other medical specialties.
2) Appreciate that sleep is an active process and the foundation for alertness involving major metabolic and hormonal changes that develop first in ontogenesis.
3) Review the definition and basic pathophysiology of obstructive sleep apnea syndrome (OSAS) and the mechanism for its’ damaging effects on ocular tissue.
4) Review the various uncommon and common ocular pathologies where OSAS may be an unseen etiology of the pathology or exacerbate the existing condition.
5) Learn the power of proper referral, diagnosis and follow-up treatment possibilities for superior systemic and ocular health.
6) Understand the Elements of Superior Sleep Hygiene
OUTLINE

1) What is Sleep
   a. History of Sleep Medicine
      i. Nathaniel Kleitman (1895 – 1999)
      ii. Eugene Aserinsky (1921 -1998)
      iii. Sleep Psychiatry, Golbin, Kravitz and Keith
   b. Periodic Physiological Changes during Sleep
      i. ERG
      ii. EOG
      iii. EKG Pulse
      iv. Erection
      v. Hormones
   c. Hypothalamic Sleep / Wake Switch
      i. Prefrontal cortex
         1. Histamine ?
      ii. Tuberomammillary Nucleus
         1. GABA & Galanin – afferent to wake switch
         2. Efferent w histamine ? to prefrontal cortex
      iii. Posterolateral hypothalamus
         1. Orexin / hyporetin – afferent to wake switch
      iv. Circadian Regulator
         1. melatonin
      v. Retino – hypothalamic tract
      vi. Ventrolateral – preoptic area
   d. Development of Alertness and Attention by age
      i. REM – youngest, baby
      ii. DELTA
      iii. Stage 2
      iv. Stage 1
      v. Wakefulness
      vi. Full attention

2) Good Sleep – Main Points
   i. SLEEP IS AN ACTIVE PROCESS
   ii. MAJOR METABOLIC and HORMONAL CHANGES HAPPEN DURING SLEEP
   iii. SLEEP BRAIN MECHANISMS DEVELOP FIRST IN ONTOGENESIS
   iv. SLEEP – IS the FOUNDATION for ALERTNESS

3) Poor Sleep – Main Points
   i. Inattentiveness and Bad Moods
   ii. Low-Quality Performance
   iii. Sleep related systemic disease
   iv. Deterioration of Existing Disorders
   v. EYE Disorders !
1. Ocular myokymia
2. Dry Eye
3. Sleep lagophthalmicus

4) Sleep disorders correlate with the clock
   i. Chrono-physiology vs. Chrono- psychiatry
      1. 4-5 yrs. Olympic
      2. 11-13 mo. Annual
      3. 3-4 mo. Seasonal
      4. 4-5 weeks Monthly
      5. 6-8 days Weekly
      6. 23-25 hrs. Circadian
      7. 1-23 hrs. Ultradian
      8. <1 hr. Microcycles

5) Females vs. Males and Sleep
   a. Sleepless more frequently (insomnia)
   b. Have more obvious symptoms of OBESITY
   c. Have less obvious symptoms of OSA
   d. More frequently have glaucoma, dry eyes, macular degeneration, papilledema

6) Sleep Study Electrophysiology / Telemetry
   a. Adult Set Up
   b. Child Set Up
   c. Infant Set Up

7) Sleep Study Reports
   a. Wakefulness
   b. Stage 1 – Eye Rolling – “non REM”
   c. Stage 2 - “non REM”
   d. Stage 3 -“non REM”
   e. REM = Rapid Eye Movements

8) Disorders of Sleep Alertness
   a. Sleep Apnea
      i. Pear Shape Face
      ii. Narrow PD
      iii. Bulbous Lips
      iv. Enlarged Neck
      v. Etc„, additional features
   b. Periodic sleep apnea syndrome
   c. Parasomnias
      i. Sleep Walking
         1. Self-Injury
         2. Sleep Forensics
      ii. Dreams are the Most Significant Stressors for Heart (1995 & confirmed)
9) Heart arrhythmias and sudden death
   a. Paroxysmal tachycardia upon awakening
   b. EKG, EEG of heart block upon awakening
   c. Triggering of acute heart attack (in sleep) by anger
10) Vestibulopathy
11) Neurological disorders
   a. Fetal Alcohol Syndrome
   b. Drowsy Driving
12) Psychiatric disorders
   a. Sleep Drawings by Patients
13) Ocular Migraines
   a. Headaches with flashing lights, blind spots in a person’s field of vision
   b. Blindness in one or both eyes lasting up to 72 hours.
14) Sleep Hygiene
   a. Make up for your loss of sleep as soon as possible
   b. Sleep is like food: you cannot catch-up to it.
      i. i.e. Not eating during the week, but trying to catch-up on your
         food intake on Sunday doesn’t work!
   c. It is better to be hungry than sleepless!
   d. Keep your wake-up time consistent
   e. Our biological clock starts in the morning.
   f. Stop worrying before sleep
   g. Your morning mood will magnify your pre-sleep feelings.
15) Help your medications
   a. Memorize their good effects.
   b. * A patient with ocular migraines has an increased risk for sleep
      problems including OSA.
16) Evaluating Early Morning Eyelid Abnormalities
   a. **Kidneys** - wide puffy bags under the eyes with the widest part of the
      swelling towards the nose.
   b. **Colon** - dry skin creases with the widest part of the swelling towards
      the ear area.
   c. **Alcoholism** - swelling of the upper eyelid and a centralized large, wide
      bag under each eye.
   d. **Heart** - swelling of the upper lids (similar to alcoholism, but smaller).
   e. **Endocrine** – "Banana" type bags under the eyes.
   f. **Enlarged adenoids** – under-eye bags with a large crease referred to as
      "Leslie Sign".
17) PART 3 – SLEEP APNEA AND THE EYE
   a. Snoring definition-
      i. **DEFINITION** - Complex acoustic phenomena involving not only
         ii. muscles but neural control.
      iii. Increased by: Fatigue, Supine position, Alcohol, Heavy meal,
        Obesity, Medications, Drugs.
b. Clinical significance of Snoring
   i. A marker of sleep apnea
   ii. An independent risk factor for vascular disease complications (HTN, cardiovascular, cerebrovascular) ?
   iii. Causes daytime dysfunction?

18) Snoring treatments
   i. Weight loss
   ii. Avoid heavy meal before sleep
   iii. Decrease and stop alcohol intake
   iv. Smoking cessation
   v. Avoid sleep deprivation
   vi. Positional devices
   vii. Nasal dilators
   viii. Sleep dental devices
   ix. ENT Surgery
   x. CPAP therapy

19) Hyponea
   i. Periodic pharyngeal occlusion with inspiratory flow limitations.
   ii. Mild respiratory fluctuation with increase respiratory resistance.
   iii. Decrease $O_2$ saturation 3-4%

20) CENTRAL SLEEP APNEA (CSA)
   b. Causes:
      i. (Respiratory) periodic breathing, tracheostomy, CPAP, oxygen, high altitude.
      ii. (Neurological): Shy-Drager s-me, Diabetes, Familial disautonomia, polio, tumor, neuromuscular meditation, hypnosis. Drugs.
      v. Treatment: CPAP, O2, theophyline, naloxone, clomipramine

21) SLEEP APNEA
   a. Complete cessation of breathing during sleep for 10 and more seconds with a drop of $O_2$ desaturation more than 4% due to upper airways obstructions.
NEW COPE  Alexander Golbin, MD, PhD  and Stuart Richer, OD, PhD, FAAO

i. Biology: OSA is a disorder of humans (except English Bulldogs). Human's Hyoid bone floats. Human have long Pharynx, large soft palate and the bend 90 degree in the airflow stream at nasopharynx.

22) Consequences

a. Recurrent episodes of asphyxia
b. Elevated blood pressure
c. Decrease diaphragmatic function on supine position.
d. Cardiac rhythm and output dysregulation.
e. Increase mortality rate due to cardiorespiratory failure (OSA -35 50 % have HTN. 9% - sudden cardiac death and 5% - stroke in sleep).
f. Obesity due to decreased metabolism
g. EYE disorders due to drop in blood oxygen saturation and vasoconstriction of peripheral capillaries in eyes.
REFERENCES


