AUGENZENTRUM
LÜNEBURG

Ocular Manifestations of OSA

Firuse Sistani, M.D., F.E.B.O.

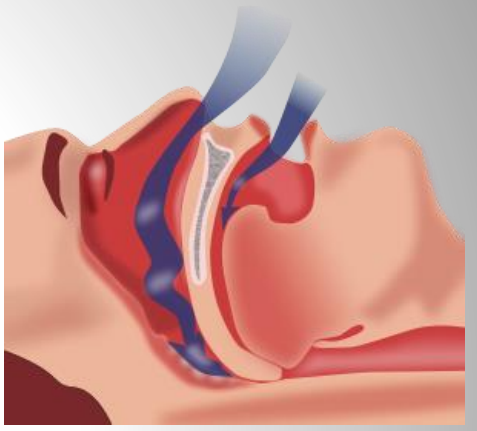
Ophthalmic surgeon

Lüneburg Eye Center

www.azlg.de

AUGENZENTRUM
LÜNEBURG

Ocular Manifestations of OSA



OSA is:

- a sleep discorder
- with nocturnal pharyngeal collapse
- hypopneic or apneic events during sleep

Causes for ocular manifestations are :

- vascular
- mechanical

AUGENZENTRUM
LÜNEBURG

Ocular Manifestations of OSA

- Floppy eyelid syndrome
- Retinal Conditions
  - retinal vein occlusions
  - central serous retinopathy
  - diabetic retinopathy
- NAION (nonarteritic ant. ischemic optic neuropathy)
- Papilledema
- Glaucoma

AUGENZENTRUM
LÜNEBURG

Ocular Manifestations of OSA

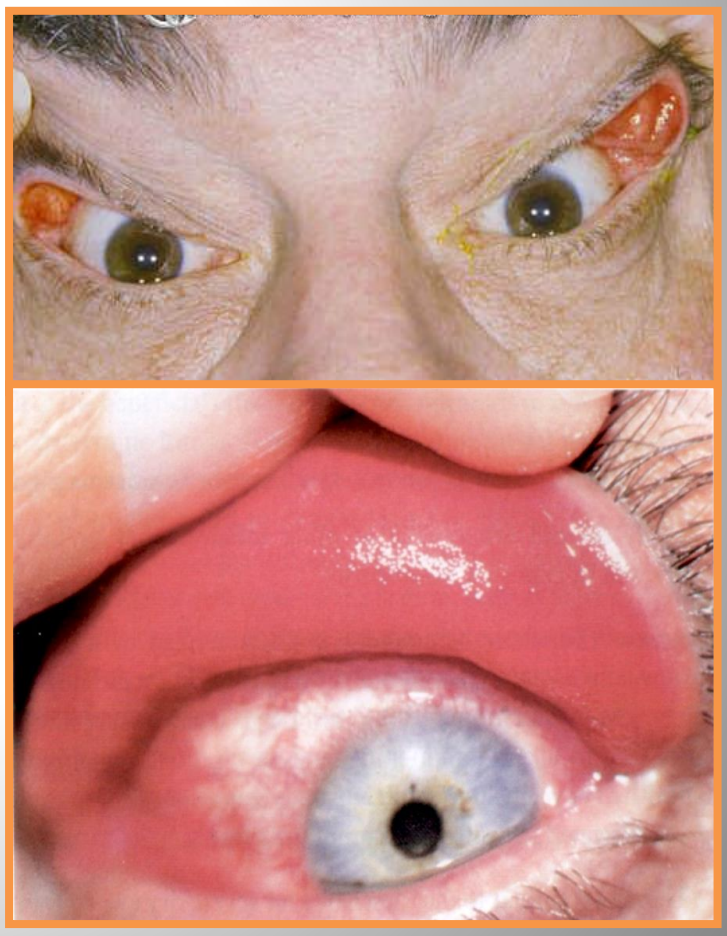
- Floppy eyelid syndrome
- Retinal Conditions
  - Retinal vein occlusions
  - Central serous retinopathy
  - diabetic retinopathy
- NAION (nonarteritic ant. ischemic optic neuropathy)
- Papilledema
- Glaucoma

AUGENZENTRUM
LÜNEBURG

Floppy eyelid syndrome (Signs and symptoms)

eyelid hyperlaxity and
easily everted eyelids

chronic irritation, discomfort,
foreign body sensation,
dryness specially by
awakening



AUGENZENTRUM
LÜNEBURG

Floppy eyelid syndrome (Signs and symptoms)

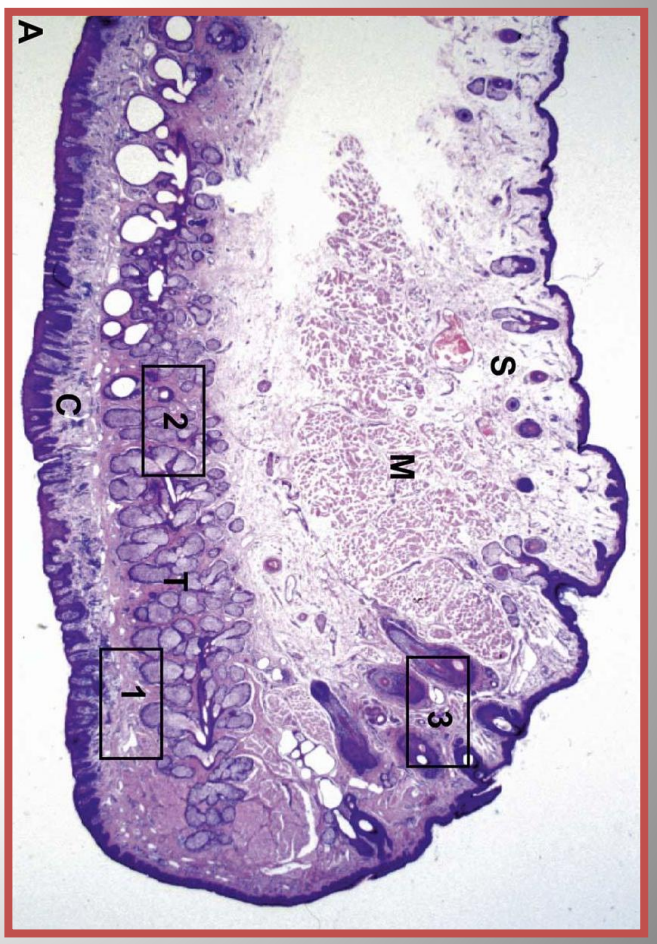
eyelash ptosis with lashes displaced downward leading to possible corneal erosions, keratitis, even perforation

AUGENZENTRUM
LÜNEBURG

Floppy eyelid syndrome (etiology)

Decreased elastin and increased matrix metalloproteinase acitivity leading to a weak tarsal plate (connective tissue weakness)

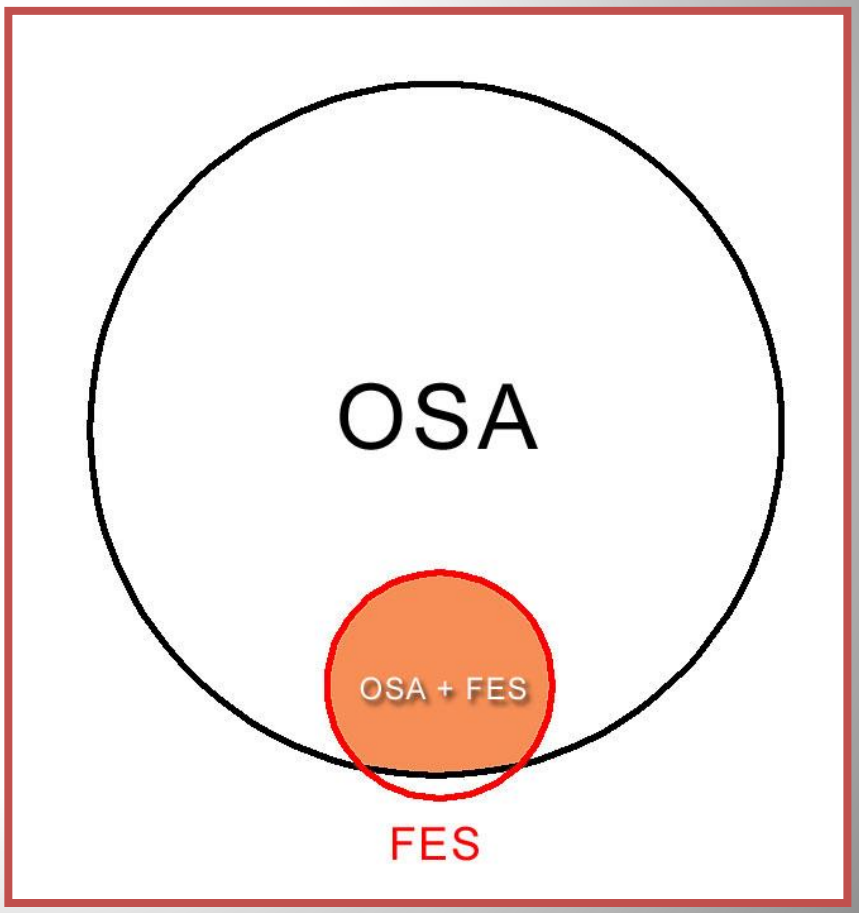
mechanical pressure and transient ischemia in lid tissue due to reduced arousability and pressure from the pillow



AUGENZENTRUM LÜNEBURG

Floppy eyelid syndrome

- 10%-20% of OSA patients have FES (40% with severe OSA)
- 96% of FES patients have OSA



Surv Ophthalmol 2010;55:35-46

AUGENZENTRUM
LÜNEBURG

Floppy eyelid syndrome (therapy)

- Artificial tears and ointments to relieve the dryness and protect cornea from exposure
- CPAP
- No Surgical correction without treating OSA!! (high rate of recurrence)

AUGENZENTRUM
LÜNEBURG

Floppy eyelid syndrome

Ask your OSA patients if they experience:

- Ocular discomfort
- Excessive tearing
- Blurry vision upon awakening

AUGENZENTRUM
LÜNEBURG

Ocular Manifestations of OSA

- Floppy eyelid syndrome
- Retinal Conditions
  - retinal vein occlusions
  - central serous retinopathy
  - diabetic retinopathy
- NAION (nonarteritic ant. ischemic optic neuropathy)
- Papilledema
- Glaucoma

AUGENZENTRUM
LÜNEBURG

Retinal conditions

Lack of OXYGEN!!!

OSA promotes:

- Virchows triad: hypercoagulability, hemodynamic changes, endothelial dysfunction
- injury and imperfect repair of blood vessels
- increased levels of VEGF

AUGENZENTRUM
LÜNEBURG

Retinal conditions
(RVO: Retinal vein occlusions)

- Second most common cause of vascular blindness
- BRVO: branch retinal vein occlusion
- CRVO: central retinal vein occlusion

AUGENZENTRUM
LÜNEBURG

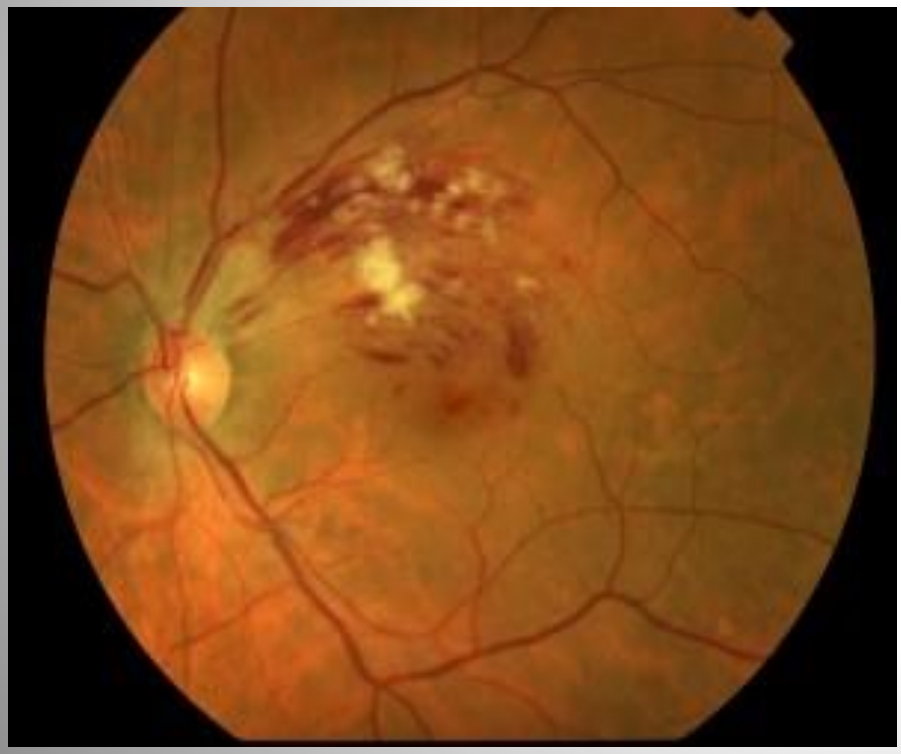
Retinal conditions
(RVO: Retinal vein occlusions)

- OSA prevalence of 77% among RVO-Patients
  (Glacet-Bernard et al.)
- related to OSA induced changes on bloodflow-autoregulation and microvasculature
- presence of hypoxemia and nocturnal ICP elevations
- hemodynamic changes in CRA due to hypercapnia leading to a compression of RV

AUGENZENTRUM
LÜNEBURG

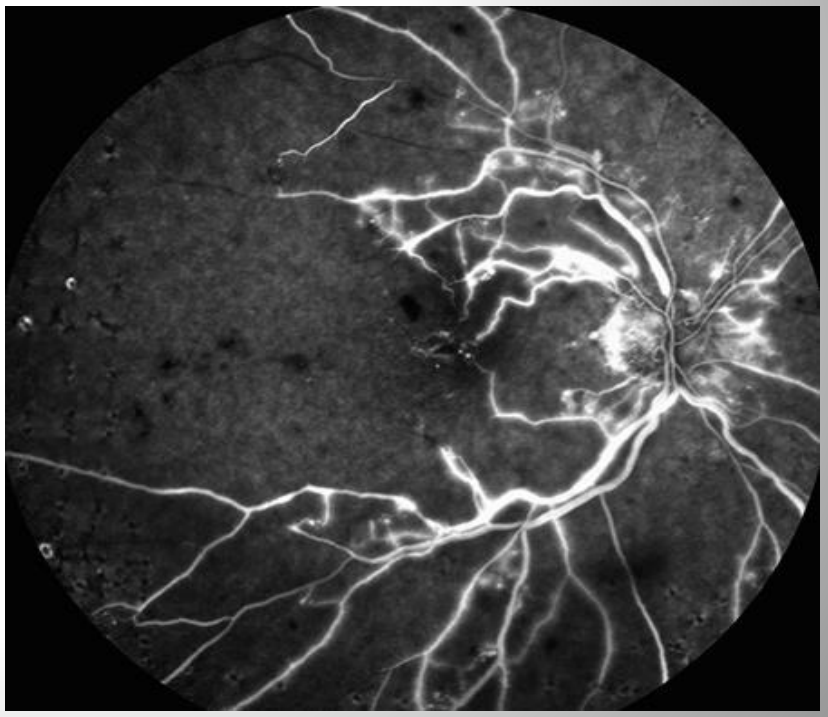
Retinal conditions

(BRVO: Branch retinal vein occlusion)



AUGENZENTRUM
LÜNEBURG

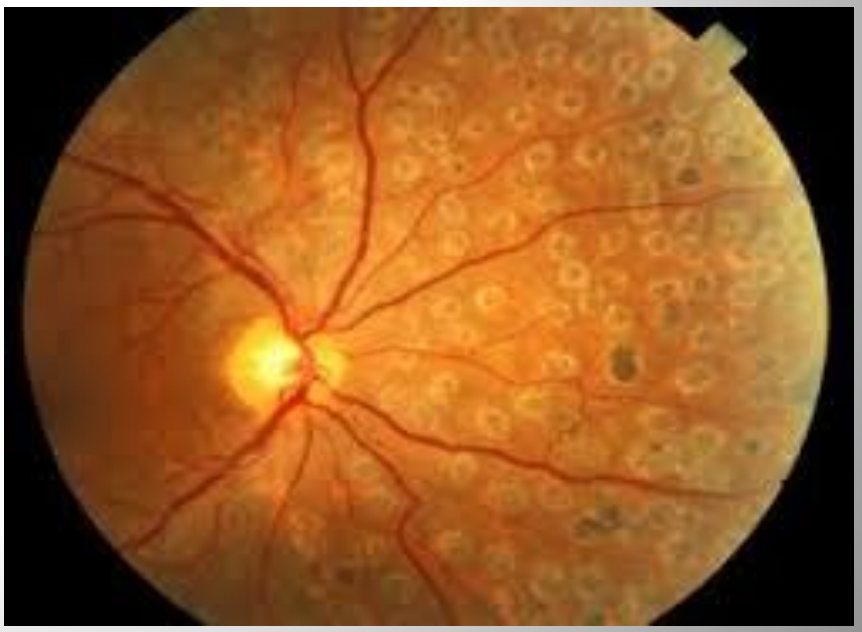
Retinal conditions
(CRVO: central retinal vein occlusion)



AUGENZENTRUM
LÜNEBURG

Retinal conditions
(CRVO and BRVO: treatment)

Argon-Laser coagulation
Anti-VEGF-Injections



AUGENZENTRUM
LÜNEBURG

Retinal conditions
(CRVO and BRVO: treatment)

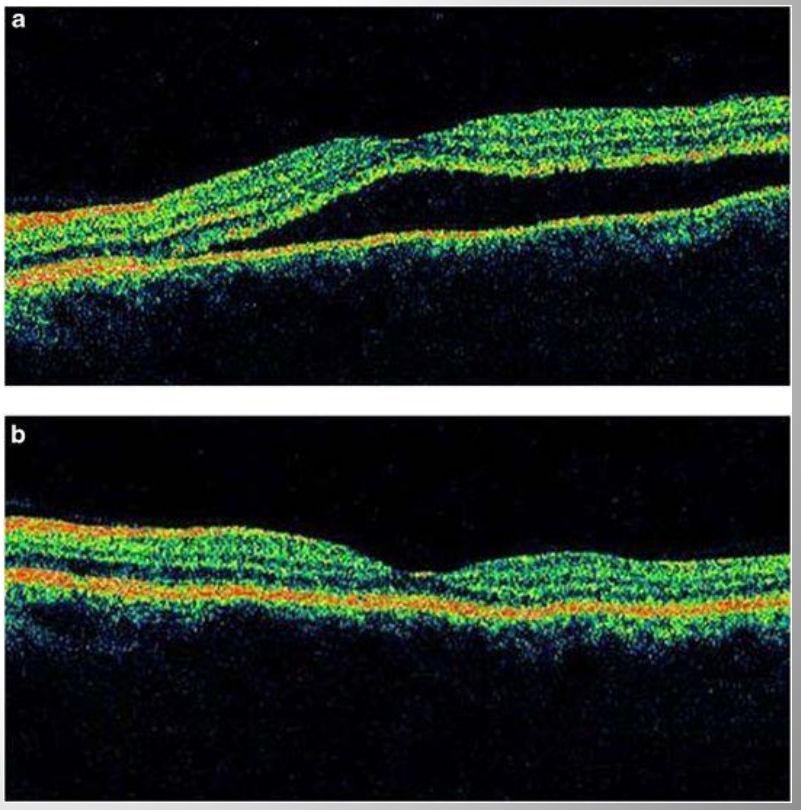
Ask your OSA patients about:

- visual symptoms
- transient loss of visual fields

AUGENZENTRUM
LÜNEBURG

Retinal conditions
(CRS: central serous retinopathy)

- idiopathic retinal detachment
- visual impairment
- metamorphopsia



AUGENZENTRUM
LÜNEBURG

Retinal conditions
(CRS: central serous retinopathy)

- association between CRS and OSA (Huon et al.)
- increased levels of epinephrine and norepinephrine known in OSA
- endothelial dysfunction in blood-retina-barrier
- subretinal fluid accumulation

AUGENZENTRUM
LÜNEBURG

Retinal conditions
(CRS: central serous retinopathy)

Ask your OSA patients about:

- visual abnormalities (darkening, image magnification, reduction of VA)
- seeing straight lines as wavy

AUGENZENTRUM
LÜNEBURG

Retinal conditions
(DRP: diabetic retinopathy)

- Nr. 1 cause of vascular blindness

- microvasculopathy, increased VEGF

- clinical presentation:

non-proliferative DRP
proliferative DRP
diabetic maculopathy

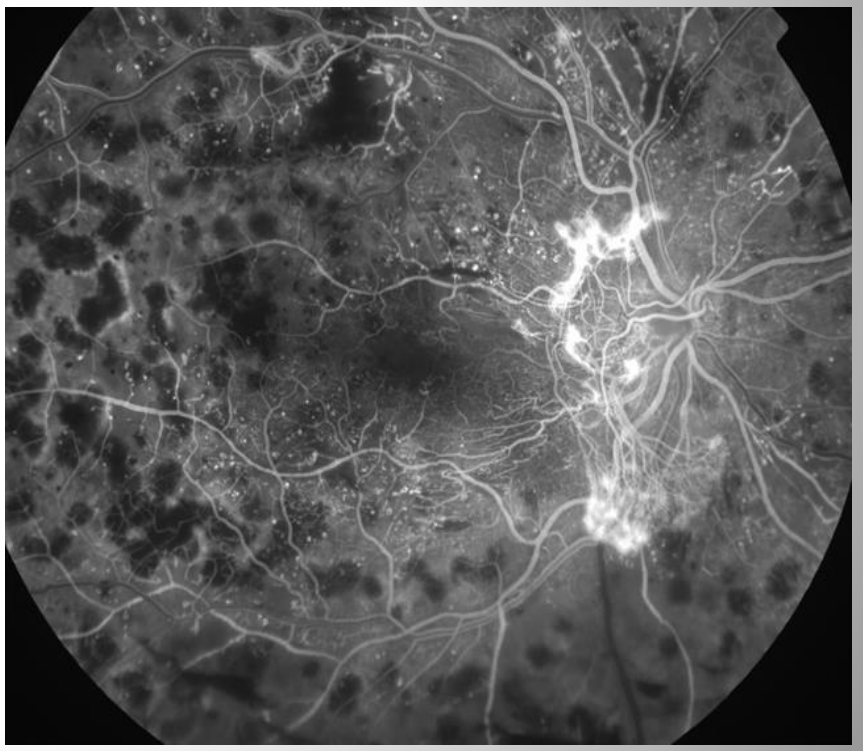
AUGENZENTRUM
LÜNEBURG

Retinal conditions
(DRP: diabetic retinopathy)

- common and severe in patients with OSA
- OSA is an independent risk factor for progression (Quratul et al.)
- CPAP, slows progression by minimizing nocturnal hypoxia

AUGENZENTRUM
LÜNEBURG

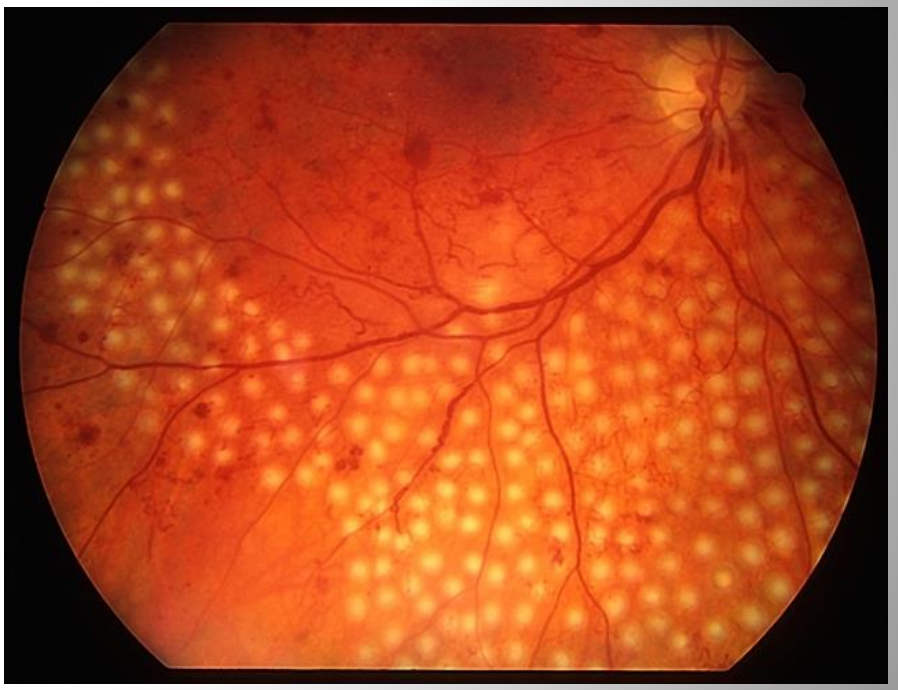
Retinal conditions
(DRP: diabetic retinopathy)



AUGENZENTRUM
LÜNEBURG

Retinal conditions
(DRP: diabetic retinopathy)

- controlling systemic diseases: blood sugar, hypertension, screen for OSA!!!!!
- Argon-Laser-Coagulation
- Injection of Anti-VEGF



Am J Ophthalmol. 2010;149:959–963

AUGENZENTRUM
LÜNEBURG

Retinal conditions
(DRP: diabetic retinopathy)

Ask your OSA patients with known diabetes:

Do you visit an ophthalmologist on a regular basis?

AUGENZENTRUM
LÜNEBURG

Ocular Manifestations of OSA

- Floppy eyelid syndrome
- Retinal Conditions
  - retinal vein occlusions
  - central serous retinopathy
  - diabetic retinopathy
  - age-related macular degeneration
- NAION (nonarteritic ant. ischemic optic neuropathy)
- Papilledema
- Glaucoma

AUGENZENTRUM
LÜNEBURG

NAION
(nonarteritic anterior ischemic optic neuropathy)

- acute, painless, irreversible visual loss
- upon awakening
- ischemia in the post. short cilliary arteries
- 15% risk for the contralateral eye

AUGENZENTRUM
LÜNEBURG

NAION
(nonarteritic anterior ischemic optic neuropathy)

- Impaired blood flow autoregulation and increased intracranial pressure during apneic episodes limit optic nerve perfusion

- 16% higher risk of development of a NAION in patients with untreated OSA (Stein et al.)

- urgent need to alleviate risk factors like
  hypertension
  diabetes
  OSA!!!!

AUGENZENTRUM
LÜNEBURG

NAION
(nonarteritic anterior ischemic optic neuropathy)

Ask your OSA patients about:

- history of a sudden visual loss in one eye upon awakening
- history of an “ optic nerve infarction”

AUGENZENTRUM
LÜNEBURG

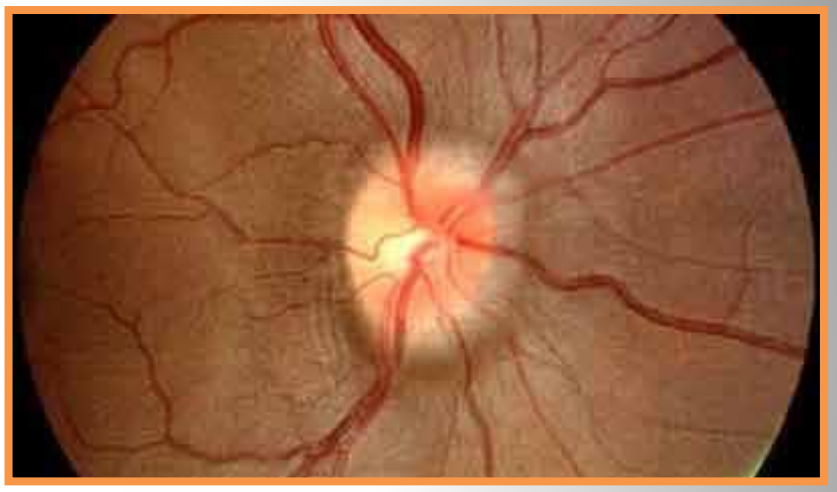
Ocular Manifestations of OSA

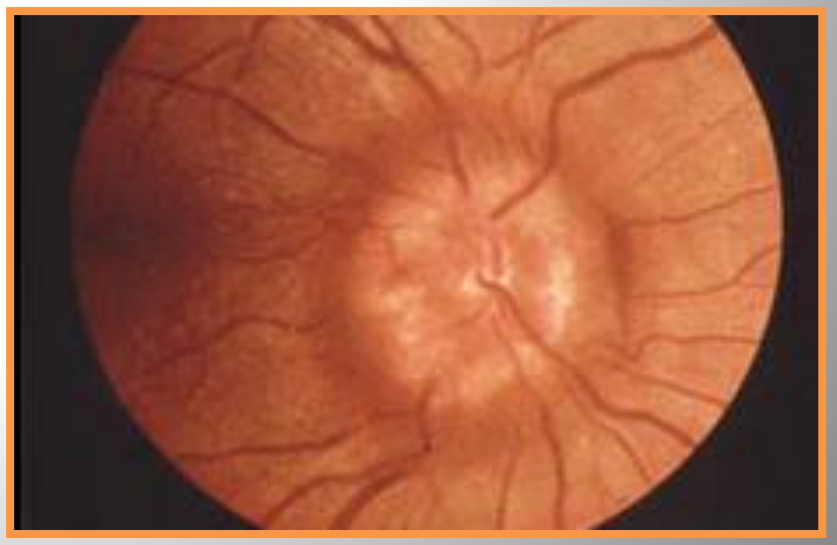
- Floppy eyelid syndrome
- Retinal Conditions
  - retinal vein occlusions
  - central serous retinopathy
  - diabetic retinopathy
  - age-related macular degeneration
- NAION (nonarteritic ant. ischemic optic neuropathy)
- Papilledema
- Glaucoma

AUGENZENTRUM
LÜNEBURG

Papilledema

- disc swelling associated with increased ICP
- symptoms of elevated ICP: headache, tinnitus, trans. obscuration of vision
- chronic papilledema may lead to optic atrophy and vision loss





AUGENZENTRUM
LÜNEBURG

Papilledema

- Persons with OSA have 30% to 100% increased risk of developing papilledema (Stein, 2011)
- Hypercapnia induces cerebral vasodilatation, which elevates ICP leading to papilledema
- Intermittent (nocturnal) increase in ICP can cause sustained papilledema (Parvin, 2000)

AUGENZENTRUM
LÜNEBURG

Papilledema

Ask your OSA patients about:

- headache, tinnitus, trans. obscuration of vision
- progressive decrease in vision

AUGENZENTRUM
LÜNEBURG

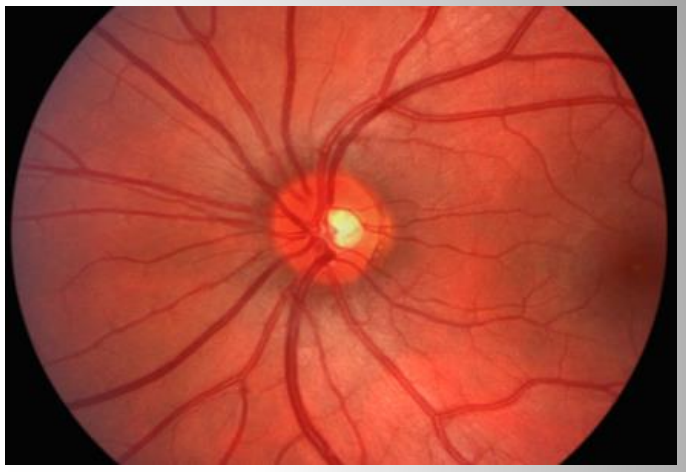
Ocular Manifestations of OSA

- Floppy eyelid syndrome
- Retinal Conditions
  - retinal vein occlusions
  - central serous retinopathy
  - diabetic retinopathy
  - age-related macular degeneration
- NAION (nonarteritic ant. ischemic optic neuropathy)
- Papilledema
- Glaucoma

AUGENZENTRUM
LÜNEBURG

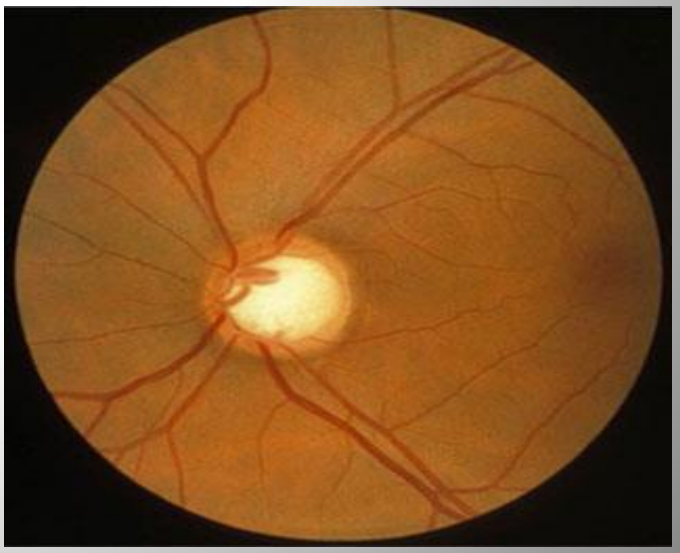
Glaucoma

- chronic progressive optic neuropathy
- second leading cause of blindness worldwide



Types:

- open angle glaucoma (OAG)
- closed angle glaucoma (CAG)
- normotensive glaucoma (NTG)

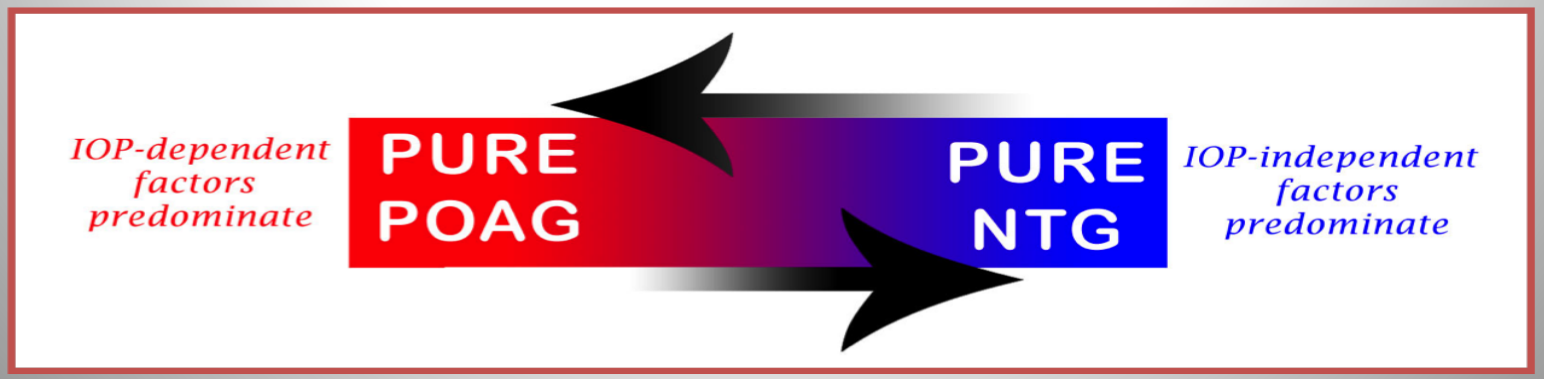


AUGENZENTRUM
LÜNEBURG

Glaucoma

- OAG and CAG are associated with an increased IOP leading to a mechanical compression of optic nerve

- NTG patients have normal IOP levels but a characteristic glaucoma damage to optic nerve



AUGENZENTRUM
LÜNEBURG

Glaucoma

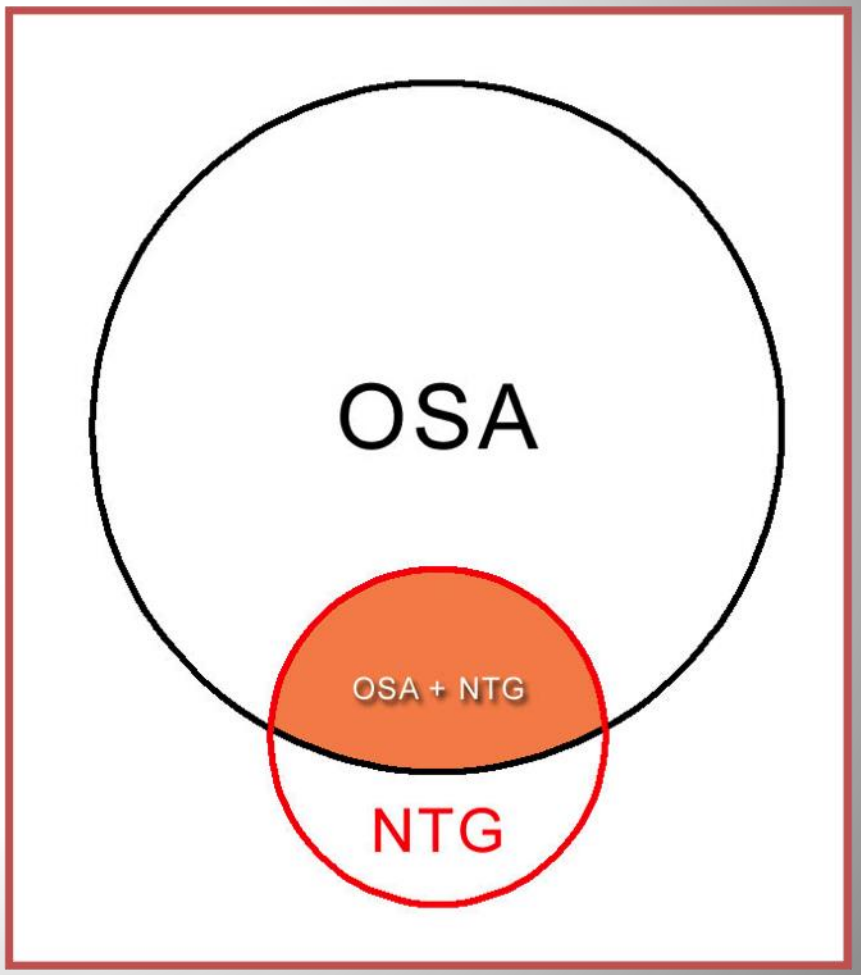
- OSA contributes to the pathogenesis of NTG through:
  -vascular effects (optic nerve ischemia)
  - episodes of hypoxia
  - hemodynamic changes
  - oxidative stress

- Patients with OSA may have optic nerve heads more susceptible to mechanical stress due to poor perfusion

AUGENZENTRUM LÜNEBURG

Glaucoma

- 5%-10% of OSA patients have NTG (<3% general pop)
- up to 50% of NTG patients have OSA
- treatment of OSA may help stabilize NTG (Kremmer, 2003) and improve VF (Sebastian, 2006)



AUGENZENTRUM
LÜNEBURG

Glaucoma

Ask your OSA patients if they:

- Have glaucoma

Note: There are no symptoms until late in the course of the disease.

Refer every OSA patient for a glaucoma screening.

AUGENZENTRUM
LÜNEBURG

Ocular manifestations of OSA (conclusions)

- Remain alert to the potential ocular sequelae of OSA to prevent permanent vision loss in these patients !

- Increased referrals between sleep specialists and ophthalmologists improves vascular and ocular health of patients with OSA

AUGENZENTRUM
LÜNEBURG

Thank you for your attention!