Retinal Complications of Obstructive Sleep Apnea
A Growing Concern!

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- Carl Zeiss Meditec
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Retinal edema is a common complication of:
1. Diabetes
2. Retinal Vascular Disease
3. AMD
4. Central Serous Retinopathy (CSR)
5. Prostaglandin analogs
6. Niacin
7. Avandia/Actos
8. Sleep Disorders (OSA)

It is hypothesized that sleep apnea, through intermittent hypoxia and blood pressure oscillations, might provoke worsening of diabetic macular edema.

When your retina doesn't get enough oxygen this will add insult to injury, exacerbating existing underlying conditions like diabetic or hypertensive retinopathy, central serous as well as AMD.

The drop in oxygen appears to unleash a host of changes, including release of catecholamine's and inflammatory cytokines which are associated with increased retinal vascular permeability and "leakage".
With increased hypoxia you also get a higher levels of systemic VEGF production/released which we know is contributory to worsening of retinal disease.

Patients with sleep apnea have been shown to have a higher incidence of hypertension, stroke, myocardial infarction, arrhythmias, diabetes, and dementia per a number of studies. In most cases, sleep apnea treatment has been associated with a decreased risk of these conditions and a clinical improvement in complications.

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So what is the incidence of sleep apnea? and why should this be considered in the Optometric setting…

About 1 in 4 men and 1 in 10 women have some clinical findings consistent with a degree of sleep apnea.

You all have these patients in your practice!!!

This does not mean that we start with eliminating the variables…..or should we?

But rather have this on our radar so that if a patient exhibits retinal complications of those known to be associated with sleep apnea we can react…

Vascular tortuosity with DEEP retinal hemorrhages
Cotton wool spots are a sign of retinal hypoxia and a common complication seen in HTN and Diabetes.

When you see 6 or more cotton wool spots in the posterior pole of a patient with DM / HTN (even controlled) you should think about OSA.

In my experience those with co-existing OSA, these patients are the ones with controlled BP (normal in your office) and report a hemoglobin A1c of 6.5 or less.....
A 36-year-old white male presents with recurrent vision loss of the left eye. He states that this is the third time in the past 2 years this has happened.

Fluorescein angiography reveals leak in the temporal parafoveal region consistent with probable central serous retinopathy.

Following a diagnosis of OSA and treatment with a CPAP device, the subretinal fluid resolved.
70 year old man with central distortion in the right eye. Note the alteration of the RPE with PED lesions and the pachychoroid…..

AMD versus CSR? What about OSA? AMD generally has a thinner choroid whereas CSR has a thicker choroid……..

Recent publications suggest a correlation of OSA and CSR is as high as 68% - Order a sleep study on CSR patients…..

Looking at this OCT there are several things to point out in regards to interpretation…

- Choroidal thickness
- RPE layer and Bruchs membrane
- “RPE dysfunction”
- Drusen??

OCT images post treatment in 2011 reveal PED lesion

I diagnosed her with CSR and discussed the stimulants of CSR including…. OSA
Sleep study confirmed severe OSA

So what do WE do when things don’t work for treatment of macular / retinal edema??

So when do we consider looking further for contributing factors….

1. The macular edema responds to treatment however “recurs” shortly after
2. The retinal edema fails to respond or becomes “refractive” to treatment
3. Initial treatment is effective and then “tachyphylaxis” is noted later
This is the first case that I diagnosed with OSA 8 YEARS AGO

Severe Non-Proliferative Diabetic Retinopathy
Diffuse Diabetic Macular Edema
Combination Therapy Advised:
Intravitreal Triamcinolone
Intravitreal Avastin
Argon Focal laser Photocoagulation

Ocular Coherence Tomography: June 2009
Some reduction in edema OD however persistent and profound ME OS
IVAK #2 OS

Ocular Coherence Tomography: October 2009
Some reduction in macular edema OU.
Observe

Ocular Coherence Tomography: December 2009
Some reduction in macular edema OU.
Observe

Ocular Coherence Tomography: February 2010
Recurrent macular edema OU
IVAK #3 OS
Ocular Coherence Tomography: March 2010
Some reduction in edema OS however recurrent edema OD
IVAK #2 OD

Ocular Coherence Tomography: April 2010
Some reduction in edema OD however recurrent edema OS
IVAK #4 OS

Ocular Coherence Tomography: June 2010
Recurrent edema OD and reduced edema OS
IVAK #3 OD

Ocular Coherence Tomography: July 2010
Some reduction in edema OD however recurrent edema OS
IVAK #5 OS

Ocular Coherence Tomography: October 2010
Recurrent edema OU
IVAK #4 OD
IVAK #6 OS

Ocular Coherence Tomography: November 2010
Increased edema OU and a steroid response now developed.
IVA OD
IVA OS
Ocular Coherence Tomography: February 2011

Some reduction in macular edema OU.

Refractory to aggressive combination treatment.

NOW WHAT???

Mr. (JH) was referred for a sleep study

Results of the sleep study:

Severe Obstructive Sleep Apnea

Treatment: Continuous Positive Airway Pressure (CPAP)

Ocular Coherence Tomography: February 2012

Lets look at some cases that I consider very common in the Optometric setting……

63 year old woman with a retinal vein occlusion is treated with serial Avastin injections………

The macular edema is refractory to treatment

HMMM..

This is when you look a little further into the case and become a detective……

✓ Actos / Avandia
✓ Niacin
✓ Prostaglandin analogs
✓ Sleep Disorders
So what do you ask the patient??

1. Do you wake up in the morning with a headache
2. Do you find it necessary to take a nap in the afternoon?
3. Do you snore?

Following a diagnosis of sleep apnea (OSA) and use of CPAP the macular edema began to resolve after 2 months.

65 year old man with Type II Diabetes and current hemoglobin A1c of 5.7... He was treated with 11 Avastin injections OU over 2 years and presented for a second opinion on management......

HMMM..

This is when you look a little further into the case and become a detective....

- Actos / Avandia
- Niacin
- Prostaglandin analogs
- Sleep Disorders

So what do you ask the patient??

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2. Do you find it necessary to take a nap in the afternoon?
3. Do you snore?

Following a diagnosis of sleep apnea (OSA) and use of CPAP the macular edema has essentially resolved in 4 months.....
83 year old man with AMD and a gradual decline in the vision of the left eye. Diagnosed with an occult CNV and treated with serial AVASTIN.....

Following serial Avastin treatment and observation the subretinal fluid resolved and remained stable........

8 months later the subretinal fluid recurred and following a second treatment with serial Avastin the OCT images remain unchanged......NOW WHAT??

1. Do you wake up in the morning with a headache
2. Do you find it necessary to take a nap in the afternoon?
3. Do you snore?

Following a diagnosis of OSA the patient was treated with a CPAP and the subretinal fluid resolved in 3 months....

Conclusions

The incidence of exudative AMD in the US alone is expected to double by 2020 to 3 million or more.

The number of people with Diabetes is estimated to reach 300 million worldwide by 2025

Diabetic macular edema (DME) and exudative age-related macular degeneration (AMD) are currently the two leading causes of visual impairment worldwide.
Conclusions

Article in RETINA 2014 (pages 2423-2430)

Poor responders to Bevacizumab pharmacotherapy in Age-Related Macular Degeneration and in Diabetic Macular Edema demonstrate increased risk for obstructive sleep apnea.

N = 106 with AMD
N = 47 with DME

Conclusions

DME – poor responders (PR) were defined as those needing an increased number of injections (3 or more)

AMD – poor responders (PR) were defined as those with persistent subretinal fluid after an induction (3) phase of treatment

DME – control 57% and “PR” 88% risk of OSA
AMD – control 36% and “PR” 79% risk of OSA

Conclusions

Symptomatic obstructive sleep apnea (OSA) currently affects between 2-4% of the population whereas up to 24% may be affected by non symptomatic OSA.

The retina has the greatest demand for oxygen during darkness and the intermittent episodes of hypoxia suffered with OSA may result in further production of VEGF

Conclusions

It is estimated that up to 80% of the moderate to severe cases of OSA are undiagnosed.

Most fascinating case of ALL…

65 year old man suffered a retinal vein occlusion in the right eye. He was treated with serial intravitreal compounds

3 Avastin – macular edema refractory
6 Eylea – macular edema refractory

Told nothing could be done at this time!!

There “WILL BE” an AP for that UW 2015 Study
Most fascinating case of ALL...:

A colleague emailed me the case to get a second opinion on management options

Of course you know what I told her to ask...

1. Do you wake up in the morning with a headache
2. Do you find it necessary to take a nap in the afternoon?
3. Do you snore?

Most fascinating case of ALL...:

You know what his answers were don’t you?

In addition to this he mentioned (as some with OSA do) that the vision in the mornings was more blurry than in the evenings.

So she brought him in for an OCT in AM and repeated in the PM and this was where it got interesting.......

Most fascinating case of ALL...:

AM

PM

Final Comments to YOU ALL......

OSA is more common than we all think (or thought) – Put in on your MHx forms

Know the retinal findings and ocular complications of OSA

Educate the PCP’s when you are suspicious

Final Comments to YOU ALL......

Smart Phrase in my EHR system:

Dr. PCP, our mutual patient has developed retinal findings and / or retinal edema that has been refractory or recurrent despite aggressive measures to stabilize. We know that sleep disorders such as obstructive sleep apnea will contribute to this pattern of complication. Please help me in obtaining a referral to a formal sleep center to rule out obstructive sleep apnea and send me the results for my clinical notes. Thank you!
Final Comments to YOU ALL…….

Follow up on the study to insure it was done

Be the advocate for your patients who are suffering from complications possibly linked to OSA

When you are suspicious just simply ask the questions……….

1. Do you wake up in the morning with a headache

2. Do you find it necessary to take a nap in the afternoon?

3. Do you snore?

Thank you for your attention unless you found it necessary to take a nap 😊

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