



# Obstructive Sleep Apnea Awareness

## Case Vignette: OSA and Color Vision Deficit

### Presenting Complaints

A 45 year old male of African American descent presented to his primary care physician's office for his six-month checkup. He is a wildlife photographer by profession and has had type 2 diabetes for 5 years. He says that has progressively been seeing all objects in the surrounding with a greenish tinge in both eyes for a month.

### Past History

His past diabetic control as recorded by his physician was excellent (HbA1c=6.8%) with no secondary systemic complications attributable to diabetes.

He does admit to snoring and reports being excessively sleepy many times, yet he claims to be sleeping approximately 8 hours nightly. The patient denies polyuria or nocturia.

### Physical Exam

A well-nourished male, in no distress. Mood and affect are appropriate.

His blood investigations (hemogram, liver and kidney function test) , cardiac evaluation (electrocardiogram, 2D echocardiogram), pulmonary function tests (including chest Xray) are all within normal limits.

He visited an ophthalmologist recently for his complaint. His best corrected visual acuity was 20/20 in both eyes. His anterior and posterior segment examination were unremarkable. Intraocular pressure was 14 mm Hg in his right eye and 12 mm Hg in his left eye. Multifocal electroretinogram showed reduced cone responses of both eyes showed reduced retinal sensitivities throughout the macular area.

- Current weight of 220 lb. (BMI of 32 kg/m<sup>2</sup>).
- Neck circumference is 15 inches (38 cm).
- Blood pressure was 118/80 mm Hg.

His arterial oxygen saturation (PaO<sub>2</sub>) documented on arterial blood gas (ABG) was 86%. Other parameters like pH, PaCO<sub>2</sub>, H<sup>+</sup>, HCO<sub>3</sub><sup>-</sup> were within normal limits. On inhalation of 100% oxygen for 15 min, he reported improvement in his visual symptoms.



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His history of snoring for the past 2 years and obesity (body mass index 32 kg/m<sup>2</sup>) was sufficient to suspect sleep apnea and inquire further. His PCP then asked the patient to complete the [STOP BANG questionnaire](#).

[The STOP-Bang questionnaire is a quick and easy screening tool with eight dichotomous (yes/no) items to assist in triaging patients with suspected OSA. It consists of 4 self-reportable (STOP: snoring, tiredness, observed apnea, and high blood pressure) and 4 demographic (Bang: body mass index [BMI; calculated as weight in kilograms divided by height in meters squared], age, neck circumference, and gender) items.]

Do you snore loudly? Louder than talking or loud enough to be heard through closed doors	No 0	Yes +1
Do you often feel tired, fatigued, or sleepy during the daytime?	No 0	Yes +1
Has anyone observed you stop breathing during sleep?	No 0	Yes +1
Do you have (or are you being treated for) high blood pressure?	No 0	Yes +1
Objective measures:		
BMI	≤35 kg/m <sup>2</sup>	0
	>35 kg/m <sup>2</sup>	+1
Age	≤50 years	0
	>50 years	+1
Neck circumference	≤40 cm 0	>40 cm +1
Gender	Female 0	Male +1
<b>3 points</b> STOP-BANG		
<b>High</b> risk of OSA		
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Figure 1. STOP Bang results



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## Testing

The patient's STOP BANG results (Figure 1) suggested a strong likelihood of sleep apnea. His PCP decided to do an additional evaluation for his excessive sleepiness using the Epworth Sleepiness Scale (ESS) tool. The ESS subjectively assesses excessive daytime sleepiness by asking patients to rate their chance of dozing off from 0 (would never doze) to 3 (high chance of dozing) for 8 commonly encountered scenarios, for a total possible score of 24.

Would never doze	Slight chance of dozing	Moderate chance of dozing	High chance of dozing	
<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	Sitting and reading
<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	Watching TV
<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	Sitting inactive in a public place (e.g. cinema or in a meeting)
<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	Being in a car for an hour as a passenger (without a break)
<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	Lying down to rest in the afternoon (when possible)
<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	Sitting and chatting to someone
<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	Sitting quietly after lunch (not having had alcohol)
<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	In a car when you stop in traffic for a few minutes
<input type="button" value="Calculate Score"/>				
Your Score				
13				

Figure 2. Epworth Sleepiness Score results

The ESS score generated was 13/24 (Figure 2). A score in the range of 13-15 is interpreted as Moderate Excessive Daytime Sleepiness . [\[About the ESS\]](#)

The PCP then opted to have him evaluated by a sleep medical professional **following** his initial sleep study.



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There are 3 options for sleep studies. These are:

1. [Polysomnography](#)
2. [Home Sleep Apnea test](#)
3. [Split night Study](#)

The PCP advised him to undergo an overnight four channel sleep study. He also completed a referral to see a sleep specialist.

## **Test results:**

The sleep study suggested moderately severe sleep disordered breathing with an apnea hypopnea index of 20.9.

## **Discussion of Treatment Plan**

An apnea/hypopnea index (AHI) of 20.9 was reported during the diagnostic portion of the study, indicating a moderately severe obstructive sleep apnea. He was advised on weight loss measures and continuous positive airway pressure (CPAP) treatment.

## **Outcome of Case**

Following his consultation with the sleep specialist, he has been under the PCP's regular follow-up. He has not experienced or complained of any color vision problems since. He reports feeling great, and his family members have noticed a huge difference in his enthusiasm and energy.

## **Teaching Points**

Color vision deficits observed in non-diabetic individuals in association with reduced arterial oxygen saturation in high altitudes are reversible when the subjects come to normal altitude of habitation or when oxygen supplementation is provided. In this case study, we observed that color vision deficits in the presence of lower blood oxygen levels improved with oxygen inhalation in a patient with diabetes who was diagnosed with obstructive sleep apnea. Deficits in color vision in diabetic patients may be associated with reduced retinal arterial oxygen saturation or oxygen tension in the tissue.

**This case highlights the need to keep in mind the presence of OSA in diabetic patients who can present with color vision problems in the absence of clinical signs of diabetic retinopathy.**



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Adapted from: Raman R, Verma A, Srinivasan S, Bhojwani D. **Partial reversal of color vision impairment in type 2 diabetes associated with obstructive sleep apnea.** *GMS Ophthalmol Cases.* 2018 Mar 8;8:Doc05. doi: [10.3205/oc000087](https://doi.org/10.3205/oc000087). PMID: 29623253; PMCID: PMC5854760.

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## Additional Reading

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