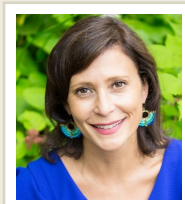
Contact Lens Update
CLINICAL INSIGHTS BASED IN CURRENT RESEARCH

Case study: MGD in a nine-year-old child

November 12, 2021



Dr. O'Dell graduated from Salus University and completed a residency at the Baltimore VA Hospital. She is a fellow of the American Academy of Optometry, a diplomate of the American Board of Optometry and a member of the OGS, TFOS, AOA, and Central PA Optometric Society.

Leslie O'Dell shares some wisdom on the value of examining the lids in a young male patient with a history of extensive digital device use.

According to the TFOS DEWS II workshop, Dry Eye is "*a multifactorial disease of the ocular surface characterized by the loss of homeostasis, and accompanied by ocular symptoms, in which tear film instability, hyperosmolarity, inflammation, and ocular surface damage, and neurosensory abnormalities, play etiological roles*."[1] There are a variety of both modifiable and non-modifiable risk factors for the 5-50% of the population affected by this disease.[2] Digital device use is a modifiable risk factor on the rise due to the COVID 19 pandemic,[3, 4] and both children and adults are reporting increasing time spent on computers for work and leisure.[5]

The Power of the Blink

Dry eye is common for those using digital screens for work, with one large study of office workers (N=3549) demonstrating that severe symptoms of dry eye were prevalent among those who used screens for >4 hours per day.[6] This association has also been found in school-age children with regard to smartphone usage, with 71% of children using smartphones exhibiting dry eye disease (DED) compared to only 50% usage for the group without DED.[7] Changes in blink dynamics are thought to be part of the reason for this correlation, with both partial or incomplete blinks as well as a decrease in blink rates noted.[8] With this change in blink dynamics, we see a negative impact on tear film homeostasis due to an increase in evaporation rates. This evaporation of the tear film can lead to the loss of ocular surface homeostasis in DED patient, initiating the cycle of inflammation that ultimately can lead to ocular surface damage.

Let's not forget about the impact of partial blinks or reduced blinks on the meibomian glands (MG), as inactivity can result in meibum stasis and obstructive gland disease. A recent study using a population control with the Old World Amish population (who have very limited exposure to electronics) showed that as little as two hours of digital device use contributed to MG atrophy.[9]

iPad use to the Max

Meet Max, a 9-year-old male presenting for an exam due to concerns regarding a possible change in vision noted by his inability to make contact with the ball for his baseball team. A thorough eye examination and refraction established his visual acuity and binocular vision were very good. However, transillumination at the slit lamp revealed severe MG truncation, which prompted further clinical investigation and meibography imaging (Figure 1).

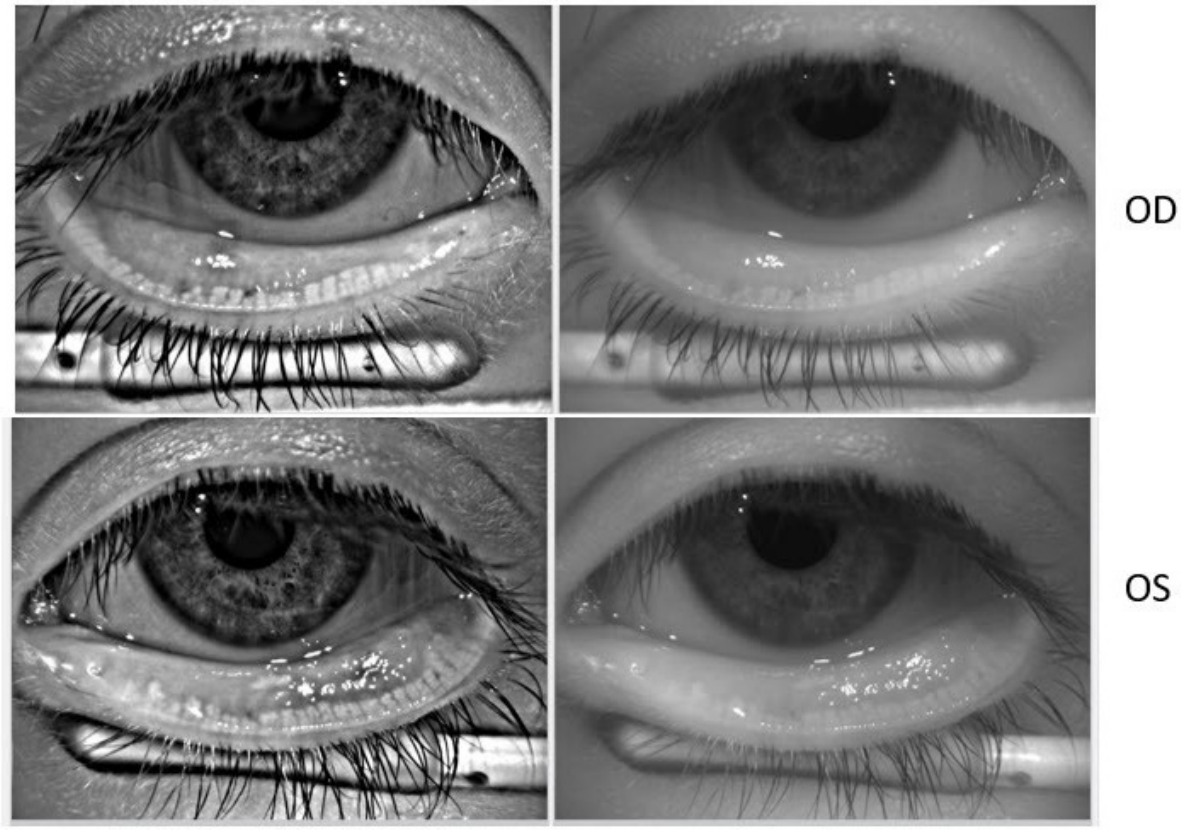


Figure 1: Meibography images of OD and OS

When asked about digital screen time, dad was very reluctant to admit that with the COVID-19 pandemic and the work from home orders, Max was spending upwards of 10-12 hours per day between school and leisure activities on his iPad. Despite those long hours, Max was not currently noticing any symptoms of digital eye strain or dry eye while using the iPad.

The exam also revealed decreased MG function OU following an evaluation of the lower eyelid using the meibomian gland evaluator (MGE) from Johnson & Johnson Vision (Figure 2). This device exerts a pressure equivalent to a full blink and the quality of meibum released from the gland orifice is graded (from 3 being clear, oily secretions, to zero being no secretions expressed). Along with grading the quality of the meibum using this method, the number of glands expressing oil can be counted and recorded. This gives the meibomian gland yielding lipid secretion score,[10] and for this patient it was found to be 2 OD and 3 OS. This confirms not only has Max got a poor gland structure but also poor function, which is a recipe for the development of marked meibomian gland dysfunction (MGD). His tear break-up time (TBUT) was normal (10 sec OU) and the cornea and conjunctiva were free of staining bilaterally.

Figure 2: MGE (image courtesy of Etty Bitton, University of Montreal)

Of note, his eyelashes were very long and lush and a papillary response was noted bilaterally. This is important for a few reasons. Eyelashes like Max's are longer than average, 1/3 the width of the eye, and this can lead to excessive evaporation as the eyelashes lose their protective attributes.[11] With more of the ocular surface exposed, evaporation increases and the eye itself is exposed to more allergens.

Treatment

1. **Education**. Lots of it. Given the asymptomatic nature of the condition for Max at present, he needed to be able to understand what had been seen and why he was being given advice to makes some changes. He and his parents were shown some clinical images to help demonstrate our findings and the chronic, progressive nature of MGD was explained. Ample time was spent educating this patient and his parents to the importance of breaks from the devices. He was encouraged to take regular breaks away from his screen, using the 20-20-20 rule as a guide (every 20 minutes, take a 20-second break and focus your eyes on something at least 20 feet away – The 20-20-20 Rule | The Canadian Association of Optometrists), and the need for frequent breaks involving blink exercises.
2. **MGD treatment.** A beaded heat mask was recommended for daily use (6-10 minutes) with the Eye Eco DERM mask, along with twice daily lid hygiene using a hypochlorous acid spray cleanser. Omega 3 supplementation was recommended with a liquid omega supplement – Eye Omega Benefits for Kids by Physician Recommended Nutraceuticals.
3. **Lipid tear supplementation**: Educated on the use of lipid tear supplementation if symptoms should present. A few to recommend include Mega 3 (Refresh), Systane Complete or Balance (Alcon), Retaine MGD (ocusoft) and Soothe XP (B+L).

4. I**n-office treatments**: As this patient ages due to the severe truncation of his MG, in office treatments with thermal pulsation may be a consideration to improve gland secretions.

We saw Max again 3 months later for a careful re-evaluation of his gland function as well as continued monitoring of the ocular surface looking for signs of evaporative DED. Continued follow up care with meibography is a must for this patient.

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