DRY EYE DISEASE AND ITS IMPLICATIONS ON VISUAL FUNCTION

OJO SECO Y SU IMPLICACIÓN EN LA FUNCIÓN VISUAL

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One of the most important changes during the 2004-2006 dry eye workshop meetings was that the definition of dry eye disease included visual function disturbances different from the 1994-1995 National Eye Institute/Industry dry eye workshop definition.

Briefly, the previous definition stated that the dry eye was a disorder of the tear film due to tear deficiency or excessive evaporation, which caused damage to the interpalpebral ocular surface and was associated with symptoms of ocular discomfort.

The current definition describes dry eye as: «Dry eye is a multifactorial disease of the tears and the ocular surface that results in symptoms of discomfort, visual disturbance, and tear film instability with potential damage to the ocular surface. It is accompanied; by increased osmolarity of the tear film and increased inflammation of the ocular surface» (1).

The inclusion of visual disturbance into the definition of dry eye disease owes to the accumulating evidence in the field that dry eye is indeed associated with dynamic visual changes (1). Although standard visual acuity testing is an excellent measure of one aspect of visual function, contrast sensitivity and glare testing provide much more important and detailed information on specifics of visual function. Recently, functional visual acuity (FVA) testing has been reported to be an important method of defining «detailed visual function» (1). The method has been shown to be efficient in the detection of «masked impairment of visual function» in dry eye patients who complain of decreased visual acuity despite normal conventional visual acuity test results.

The Functional Visual Acuity Measurement System (Nidek, Japan) is currently available only in Japan and is used to examine the time wise change in the continuous visual acuity. The measurements are begun from the baseline established best corrected Landolt conventional visual acuity, in each subject.

Optotypes are presented at a distance of 2.5 m in all patients, with a baseline best VA greater than or equal to 20/200. Each Landolt optotype is presented at a certain visual acuity level within the device subtending an equivalent angle to the optotype of the same visual acuity level presented from 5 m during the conventional Landolt visual acuity testing. The presentation time of an optotype is adjustable and optotypes are changed automatically within the previously set presentation time frame when the test subject responds to a presented optotype.

Patients delineate the orientation of the automatically presented Landolt rings by handling the joystick from the base-line best corrected visual acuity from the start. The Landolt ring increases in size automatically when the answer is incorrect. If the Landolt ring is recognized correctly, the same size ring is displayed at random again. Visual acuity during 60 seconds is checked as records of FVA (2).

The definition of FVA testing has been suggested to be an important indication of an individual’s performance in relation to certain daily activities such as driving, reading and VDT works (2).

Goto et al previously reported abnormalities of functional visual acuity in dry eye subjects (2). FVA has also been reported to be effective in evaluating dynamic visual function changes in dry eyes after LASIK (3). Ishida et al also reported that functional

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visual acuity in dry eyes was significantly lower than control subjects and that functional visual acuity after punctum plug insertion improved significantly (4).

The 10-second FVA and corneal opacity as well as presence of corneal vessels have been reported to show correlation with each other in majority of the Stevens-Johnson syndrome patients in a recent study. However, no significant relation between baseline FVA scores and conjunctivalization as well as meibomian gland disease were shown (5).

Interestingly, no relation between the FVA scores and fluorescein staining severity scores in SJS patients could be shown in that study. The study suggested that corneal lesions involving the optical axis rather than punctuate staining seemed to have more impact on the FVA scores. It has been reported that an irregular corneal surface resulting from aqueous deficiency is associated with poor quality of vision (5).

A recent study using a new non-invasive tear stability analysis system (TSAS) which evaluated the tear stability with dynamic videokeratoscopic images of the tear film captured continuously every second for 10 seconds, employing topographical surface regularity and asymmetry indices revealed significant degradation of the kinetic tear stability in dry eye patients with worsening of the indices over time. That study also showed improvement of surface regularity and asymmetry indices in dry eye patients who underwent punctum plug occlusion (6). Although TSAS measurements were not performed in that study, time-wise worsening of corneal surface regularity and asymmetry indices in dry eyes might result in the decreased FVA scores in dry eye patients.

The findings that FVA improved in dry eye patients undergoing punctum plug treatment might be explained by improvement in such topographical indices.

Simultaneous dynamic TSAS and FVA measurements in dry eye patients are essential and would provide very interesting information. In addition, studies looking into the correlations between the FVA scores and National Eye Institute (NEI) or Ocular Surface Disease Index (OSDI) scales would also provide invaluable information.

In summary, FVAM system is a new technology which seems not only to be an effective tool in the assessment of dynamic visual acuity changes in dry eyes, ocular surface diseases and normal subjects but promising in evaluating the outcome of management of dry eye disease.

REFERENCES