Quantification of Pupillary Light Reflex Abnormalities in Patients with Neuromyelitis Optica Spectrum Disorder and Multiple Sclerosis Using Automated Infrared Pupillometry

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Introduction:

Both Neuromyelitis Optica Spectrum Disorder (NMOSD) and Multiple Sclerosis (MS) patients experience Optic Neuritis (ON) attacks and pupillary light reflex abnormalities.

Aims:

To differentiate pupillary response variation in RRMS from NMOSD and to evaluate the potential usefulness of manual quantitative pupillometry.

Methods:

In this cross-sectional study, we investigated pupillometry parameters such as Neurological Pupil Index (NPi), percentage change of pupil size (CH), Constriction Velocity (CV), Maximum of Constriction Velocity (MCV) and latency from 315 subjects (182 RRMS, 23 NMOSD, 110 healthy control). Regarding the observed association of age with disease progression in the sample population, partial correlations for each group while holding effect of age constant were run. As ON may play a significant role in pupillary response, subclassification according to ON state of eyes was also applied. Finally, linear regression was run to model the relation between EDSS and pupillary parameters.

Results:

EDSS was partially correlated with almost all pupillary variables. Different groups indicated a statistically significant increase in latency with r=0.0.468, $p< 0.005$ for NMOSD and r=0.171, $p< 0.005$ for RRMS group, and further a decrease in almost all other variables such as CH, NPI and MCV. The linear regression also revealed that age might play the role of suppressor mediator in NPI-EDSS relation.

Conclusions:

The results revealed that NMOSD and RRMS exacerbate pupillary response in line with and similar to aging process. The degree of this exacerbation might associate to the particular pathophysiologic process of diseases. Moreover, even in absence of ON, response alteration may be expressed in terms of EDSS.