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Pupillometry in myasthenia gravis

D Fotiou*[1], I Tsiptsios[1], G Rizos[1], G Karatasos[1], A Goulas[2] and F Fotiou[1]

Address: [1]Laboratory of Clinical Neurophysiology, General Hospital AHEPA, Aristotle University of Thessaloniki, Greece and [2]Lab of Fluid Mechanics, Aristotle University of Thessaloniki, Greece

* Corresponding author

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Background

Impaired eye movements and other disorders of the visual system, such as diplopia and ptosis of the eyelid are among the most common clinical manifestations of myasthenia gravis (MG), while the disorders of pupil size and papillary dysfunction are less well-known and has never been fully resolved. Glaser (1981) and David A. (2002) categorically stated that the pupils are unaffected whereas Wilson (1940) and Walton (1977) indicate that the pupils may be sluggish or exhibit fatigability. One of the most interesting features of the eye is the pupil's reaction to light. The pupil serves as a gain-control device for the visual system. It responds to luminance changes in the environment, and this response is largely governed by a well-characterized subcortical projection through the pretectum to the accessory oculomotor nucleus (Lowenfeld 1993). The purpose of this study was to measure the pupil reaction to light by using a new technologically infrared video pupillometer in subjects with a newly diagnosed myasthenia gravis.

Material and Methods

Twenty eight patients and twenty controls were studied. All patients (18 females and 10 males) with a ranging between 22 and 65 years were free of any other neurological or ophthalmological disease. In order to study the pupil reaction to light (velocity, acceleration and other parameters), a new system was developed in the clinical neurophysiology laboratory in collaboration with the fluid mechanics section of the Aristotle University of Thessaloniki. This system of pupillometry consists of: 1) an infrared camera of 260 frames per second 2) an SLE lamp 3) an infrared spot light 4) a head mounting device. With central control from a P/C and fully automatised the system consists of a digital camera with recording ability of 260 frames per second (a simple non-digital camera gets 25 frames per second). This high recording ability allows precise calculations of this minute velocity, acceleration and other parameters while simultaneously a fully statistical analysis is being processed by using the summing average of all the recordings.

Results

Statistically important differences were observed between two groups in relation to the maximum velocity and maximum acceleration to mysis, while the pupil reaction time for mysis was clearly delayed in the group of the myasthenic patients. Statistically important differences were observed and after the treatment with pyridostigmine.

Discussion

The results of this study suggest that patients with myasthenia gravis demonstrated diminished amplitude, velocity, acceleration and other parameters. The strict selection criteria of newly diagnosed MG patients free of any neurological or ophthalmological disease, with best corrected visual acuity of 20/20, and showing a good response to pyridostigmine treatment, excludes the possibility that other factors could have produced the differences in pupil reaction to light between patients and normal subjects. In conclusion, from the above results it seems that pupillometry is an easy to use non invasive method that contributes to the early diagnosis of myasthenia gravis while it can give us information for the therapeutic outcome.