Objective: To explain the log unit range and laterality of the relative afferent pupil defect (RAPD) in patients with optic tract lesions.

Background: Patients with pure optic tract lesions can have a 0.3 to 1.0 log-unit RAPD, implying a 2- to 10-fold difference in pupillomotor sensitivity between the two eyes, which seems hard to explain simply based on the 53:47 proportion of decussating and non-decussating ganglion cell fibers found histologically. We sought to explain this discrepancy.

Design/Methods: Computerized pupillometry was used to quantify the pupil light reflex from the nasal hemifield, temporal hemifield, and full field of each eye of 5 patients with pure optic tract lesions. Light stimuli were given at 6 intensities (0.5 log-unit steps), and repeated 12 times for each stimulus condition. The mean pupil contraction amplitude was plotted as a function of stimulus light intensity and the log-unit RAPD was determined pupillographically.

Results: In all 5 patients, the pupil response from the seeing temporal hemifield ipsilateral to the tract lesion was greater than the seeing contralateral nasal hemifield, and this temporal-nasal asymmetry increased with increasing stimulus intensity. When the RAPD was calculated from the difference in light sensitivity (x-axis shift in the intensity vs. pupil response curves), it ranged from 0.6 to 1.6 log-units among the 5 patients. However, when the percentage of decussating pupil fibers was estimated from the ratio of pupil contractions between the temporal and nasal hemifield (y axis ratio of the intensity vs. pupil response curves), it ranged from 57% to 61%.

Conclusions: The log-unit RAPD can be explained by the light sensitivity difference between the intact temporal and nasal hemifield in optic tract lesions, but the percentage of decussating fibers is more equivalent to the ratio of the pupil contraction amplitudes, which is not the same as the log-unit RAPD.

References:

Keywords: pupil, optic tract, relative afferent pupil defect

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