Comparison of objective and subjective techniques of strabismus measurement in adults with normal retinal correspondence

Derek Bitner, MD\(^1\), Ore-Ofe Adesina, MD\(^1,2\), Bradley Farris, MD\(^3\), R. Michael Siatkowski, MD\(^1\)

1: Dean McGee Eye Institute, University of Oklahoma College of Medicine; 2: Cizik Eye Clinic, University of Texas at Houston

Introduction: Accurate measurement of strabismus is vital to diagnosis and treatment. Ophthalmologists frequently use subjective testing techniques such as manifest refraction but such techniques are infrequently used in the measurement of strabismus. We decided to prospectively compare the amount of strabismic deviation measured using both objective (alternate prism cover testing) and subjective (red glass test) methods. Since surgeries are most frequently planned for the largest measured total deviation, it was felt that if a larger deviation were measured with a specific technique it would signify a more sensitive test. We hypothesized that subjective measurement techniques would measure larger deviations than objective ones.

Methods: Patients 18 years old and older with strabismus, visual acuity better than 20/40 in each eye and normal retinal correspondence (NRC) had deviations measured in primary gaze at distance and near using the objective alternate prism cover (APCT) and subjective red glass tests (RGT). Continuous data were summarized using mean (standard deviation) and median (range). Median comparison of each deviation measure (primary horizontal, primary vertical, near horizontal, and near vertical) between the 2 methods (APCT vs. RGT) was made using the signed rank test for paired data. For each measure, the deviation status (yes/no) under the 2 methods was compared using the McNemar’s test. A 2-sided p-value of < 0.05 defines statistical significance. Approval was obtained from the University of Oklahoma College of Medicine IRB prior to the initiation of the study.

Results: 67 groups of measurements have been obtained to date. The RGT tended to measure larger horizontal and vertical deviations at distance and near although 78% of measurement sets (n=258) were not at a clinically significant level (difference of ≥5 on horizontal measurement or ≥3 on vertical measurements). A difference ≥10 occurred in 7% of the measurement sets. The RGT detected a vertical deviation not detected on APCT more frequently at both distance (13 vs 5, p=0.025) and near (16 vs 1, p=0.011) although all of the deviations were <5 prism dipters.

Discussion: While in the majority of cases both tests measured similar deviations, the RGT was more likely to measure a slightly larger horizontal and vertical deviation at both distance and near. There was a tendency for clinically significant differences (defined as ≥5 PD difference for horizontal measurement and ≥3 vertical) to be found by the RGT but these occurred only 16% of the time. Deviation discrepancy of >10 PD occurred rarely and there was no statistically significant trend for either technique to measure a larger deviation in these cases. Our data suggest that the subjective technique (RGT) of measuring strabismus is a reliable test and slightly more sensitive than APCT in some patients. Due to the relatively small differences in deviation the differences measured would be unlikely to be significant in the surgical management of strabismus, but the ability to detect even small vertical deviations could be beneficial in the prescribing of prismatic correction.