THE ACCURACY OF CONFRONTATION VISUAL FIELD TEST IN COMPARISON WITH AUTOMATED PERIMETRY

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The accuracy of confrontation visual field testing was determined for 512 visual fields using automated static perimetry as the reference standard. The sensitivity of confrontation testing excluding patchy defects was 40% for detecting anterior visual field defects, 68.3% for posterior defects, and 50% for both anterior and posterior visual field defects combined. The sensitivity within each group varied depending on the type of visual field defect encountered. Confrontation testing had a high sensitivity (75% to 100%) for detecting altitudinal visual loss, central/centrocecal scotoma, and homonymous hemianopsia. Confrontation testing was fairly insensitive (20% to 50% sensitivity) for detecting arcuate scotoma and bitemporal hemianopsia. The specificity of confrontation testing was high at 93.4%. The high positive predictive value (72.6%) and negative predictive value (75.7%) would indicate that visual field defects identified during confrontation testing are often true visual field defects. However, the many limitations of confrontation testing should be remembered, particularly its low sensitivity for detecting visual field loss associated with parasellar tumors, glaucoma, and compressive optic neuropathies. (*J Natl Med Assoc.* 1991;83:895-898.)

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Although visual field evaluations are being performed with progressively more sophisticated tools, confrontation visual field testing remains one of the mainstays for assessing visual fields.[1] Confrontation testing is a simple and inexpensive method of identifying visual field loss. Yet the question remains, how good is confrontation testing? The accuracy of confrontation testing has been compared previously with Goldmann kinetic perimetry.[2] However, many researchers believe that automated static perimetry is more sensitive than Goldmann kinetic perimetry.[3-7] This article describes a study comparing the accuracy of confrontation testing with automated static perimetry.

SUBJECTS AND METHODS

The records of 317 consecutive patients who were evaluated over a one-and-a-half-year period and who underwent both confrontation testing and automated static perimetry were reviewed retrospectively. All confrontation testing was performed by the same experienced perimetrist (LNJ) prior to the automated perimetry.

Confrontation Testing

The examiner presented his index fingers simultaneously in the opposing visual hemifields of a monocularly viewing patient (one eye occluded). The patient, who maintained fixation on the examiner's opposite eye, was asked to identify which of the examiner's index finger(s) wiggled (oscillation less than 5°). All four visual field quadrants were tested and at least two different positions within each quadrant were assessed.

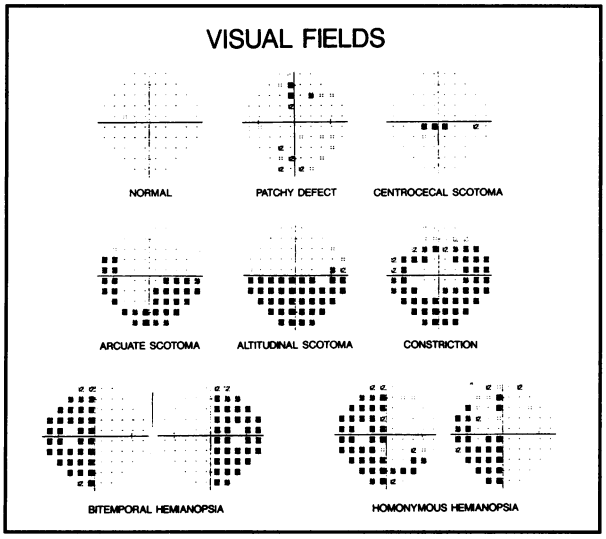

Figure. Representative visual fields on Humphrey automated perimetry (program 30-2) pattern deviation, which uses 76 test points spaced 6° apart to assess the central 30°.

Additional positions within a quadrant were tested if a defect was identified. The examiner sat approximately 66 cm from the patient, thus the location of the fingers provided an assessment of the central 35°. Once completed, the patient was asked to identify areas of the examiner's face that were perceived as missing or distorted, while monocularly maintaining fixation on the examiner's nose. This was performed at a distance of approximately 30 cm from the patient, thus providing an assessment of the central 13°. Respect of the vertical and horizontal meridians was sought whenever visual field defects were identified.

Automated Static Perimetry

Full threshold visual field examination of the central 30° of vision was obtained with the Humphrey automated static perimeter. Either 72 test points (program 30-1) or 76 test points (program 30-2) spaced 6° apart were analyzed. Patients were given a 5- to 10-minute rest period between each eye examination, and additional rest periods were provided as needed.

Patients were excluded from the study if significant ptosis or functional visual loss was found. Visual fields were excluded if two or more of the following validity parameters were exceeded: fixation losses, false-positive error, or false-negative error greater than 30%; or short-term fluctuation greater than 3dB. Visual fields were classified as normal, anterior defects, and posterior defects. Anterior visual field defects included lesions of the retina and optic nerve. Posterior visual field defects included lesions from the optic chiasm to the occipital lobe. Posterior visual field defects such as homonymous hemianopsia, bitemporal hemianopsia, and junctional scotoma that produced visual loss in both eyes were classified as single visual field defects. Thus, a maximum of 634 visual fields (normal or anterior defects only) or a minimum of 317 visual fields (posterior defects only) would be analyzed if the visual fields of all 317 patients met the criteria.

Sensitivity, specificity, positive predictive value, and negative predictive value were calculated using automated perimetry as the reference standard. Sensitivity was defined as the ratio of true visual field defects identified by confrontation testing to the number of defects present on automated static perimetry. Specificity was defined as the ratio of true normal visual fields identified with confrontation testing to the number of normal visual fields on automated static perimetry. The positive predictive value was defined as the ratio of true confrontation visual field defects to the total number of confrontation defects identified. The negative predictive value was defined as the ratio of true normal confrontation visual fields to the total number of normal confrontation visual fields.

RESULTS

Thirty-three of the 317 patients were excluded because of ptosis or functional visual field loss. Thus, a total of 284 patients were included in the study. The patients' ages ranged from 8 to 90 years (mean: 45 years). Various disorders included ischemic, infiltrative, or compressive optic neuropathy; glaucoma; parasellar and other intracranial tumors; and strokes. Fifteen visual fields were excluded because of poor visual field tests as identified by the validity criteria, leaving a total of 512 visual fields in the final data analysis. Of these, 347 normal visual fields were identified by automated static perimetry. The remaining visual fields consisted of 124 anterior defects and 41 posterior defects (Figure). The majority of the anterior visual field defects were arcuate scotomas (46) and patchy defects (49). Patchy defects were defined as three or more contiguous points of depression on automated static perimetry that did not fit a specific pattern such as altitudinal visual field loss or central scotoma. There were 10 visual field constrictions, which were defined as circumferential loss of light sensitivity encroaching within 18° of fixation. There were seven altitudinal field defects, six central/

TABLE 1. CONFRONTATION TESTING

Result	*n*	%
Sensitivity		
Anterior defect	33 of 124	26.6 [40.0]*
Posterior defect	28 of 41	68.3
Combined (anterior & posterior)	61 of 165	37 [50]*
Specificity	324 of 347	93.4
Positive predictive value	61 of 84	72.6
Negative predictive value	324 of 428	75.7

*Sensitivity in brackets excludes patchy defects for which the sensitivity on confrontation testing was 6.1% (3 of 49).

TABLE 2. SENSITIVITY OF CONFRONTATION TESTING

Visual Field Defects	CT/AP Defects*	Sensitivity (%)
Anterior Defects	33 of 124	26.6 [40]†
Altitudinal scotoma	7 of 7	100
Central/centrocecal scotoma	6 of 6	100
Monocular hemianopsia	2 of 3	66.7
Constriction	5 of 10	50
Paracentral scotoma	1 of 3	33.3
Arcuate scotoma	9 of 46	19.6
Patchy defects	3 of 49	6.1
Posterior Defects	28 of 41	68.3
Homonymous hemianopsia	19 of 25	76
Junctional scotoma	3 of 4	75
Bitemporal hemianopsia	6 of 12	50

*CT/AP represents the ratio of visual field defects identified by confrontation test to automated perimetry.
†Sensitivity in brackets excludes patchy defects.

centrocecal scotomas, three monocular hemianopsias, and three paracentral scotomas. The majority of posterior visual field defects were homonymous hemianopsias (25). There were 12 bitemporal hemianopsias and four cases of junctional scotomas.

The combined sensitivity of confrontation testing (Tables 1 and 2) for detecting both anterior and posterior visual field defects was 37% (61 of 165). However, the sensitivity for anterior visual field defects as a group was 26.6% (33 of 124), and posterior visual field defects was 68.3% (28 of 41). The sensitivity for detecting patchy defects was 6.1% (3 of 49). With patchy defects excluded, the sensitivity of confrontation testing for detecting anterior visual field defects increased to 40% (30 of 75), and the combined sensitivity for detecting anterior and posterior defects increased to 50% (58 of 116).

For anterior visual field defects, confrontation visual field was 100% sensitive for detecting altitudinal visual field loss (seven of seven) and central/centrocecal scotomas (six of six). Monocular hemianopsia had 66.7% sensitivity (two of three). Confrontation testing was poor at detecting visual field constriction at 50% (five of 10), paracentral scotomas at 33.3% (one of three), and arcuate scotomas at 19.6% (nine of 46). For posterior visual field defects, the sensitivities were high for detecting homonymous hemianopsias at 76% (19 of 25) and junctional scotomas at 75% (three of four), but low for bitemporal hemianopsias at 50% (six of 12). The specificity of confrontation testing was high at 93.4% (324 of 347). The positive predictive value of confrontation testing was 72.6% (61 of 84), while the negative predictive value was 75.7% (324 of 428).

DISCUSSION

Visual field evaluation may assist in corroborating or identifying intracranial or intraorbital diseases. Several methods of visual field assessment are available, such as confrontation testing, tangent screen perimetry, Goldmann kinetic perimetry, and automated static or kinetic perimetry. The value of confrontation testing is that it allows rapid and inexpensive detection of visual field defects. However, the sensitivity of confrontation testing for detecting visual field loss depends on the type of visual loss present. The confrontation technique used in this study had a high sensitivity for altitudinal visual field loss, central and centrocecal scotomas, and homonymous hemianopsia.

As a clinical adjunct, confrontation testing may aid in identifying disorders that produce altitudinal visual field defects such as ischemic optic neuropathy, central scotoma associated with optic neuritis, and homonymous hemianopsia often due to stroke or tumor.[8] However, certain disorders produce visual field defects for which the sensitivity of confrontation testing is poor, such as arcuate scotomas from glaucoma, thyroid eye disease, or compressive optic neuropathies. Likewise, bitemporal hemianopsia resulting from pituitary and other parasellar tumors was associated with a low sensitivity (50%) of detection with confrontation testing. This low sensitivity might have occurred because these visual field defects were often relative rather than near absolute scotomas. Red button testing,

an alternate method of confrontation testing, has been reported to have high sensitivity and specificity for identifying hemianopic defects.[2] This method was not used in this study. Anecdotally, we also have found that red button testing has a high sensitivity for detecting visual field loss, but the specificity appears to be low, with visual field defects being identified when there was no visual field loss present.

It is uncertain whether the confrontation technique described here is superior to other methods, as there are no other reports comparing confrontation testing with automated perimetry. Trobe and colleagues compared confrontation visual field testing with Goldmann kinetic perimetry.[2] The methods used in their study (which approximated our technique) combined kinetic boundary testing and static two-quadrant comparison. The calculated sensitivity of detecting visual field loss using their combined methods was 18.1% for arcuate scotomas and 71.5% for hemianoptic visual field defects.[2,9] This was similar to our results in which the sensitivities were 19.6% (nine of 46) for arcuate scotomas and 68.2% (30 of 44) for all hemianoptic visual field defects. Both studies indicated that at least 25% of hemianopsias go undetected with confrontation testing. No further comparisons can be made as their study was comprised of a different patient population and assessed visual field defects anterior to and including the optic chiasm only; in addition, neither study performed both automated static and Goldmann kinetic perimetry.

This retrospective study revealed that normal visual fields on automated perimetry were often normal on confrontation testing, with a high specificity of 93.4%. The high sensitivity of certain visual field defects (75% to 100%), high positive predictive value (72.6%), and high negative predictive value (75.7%) obtained with confrontation testing indicated that visual field defects discovered on confrontation perimetry were often true defects. Nevertheless, caution should be applied as the posterior probability, or probability of disease being present given a positive confrontation test, depends on the patient population studied.[10] Examinations confined to a generally youthful population will result in a lower probability of disease despite a positive confrontation test. However, examinations of an elderly population or another population in which visual impairment is more likely will result in a higher probability of disease given a positive confrontation test.[11,12] While confrontation testing can provide useful information, physicians need to keep in mind that this type of testing may not detect significant disease such as parasellar tumors, glaucoma, and compressive optic neuropathies.

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