Commentary: Wavefront aberrometry-based objective refraction – Accuracy versus convenience?

Objective measurement of refraction manually by static retinoscopy followed by subjective refraction has been a historically revered method of prescribing glasses to patients. Even though time consuming and variable, this conventional approach is still considered optimal method of refraction among optometrists and ophthalmologists in their clinical practice.

However, recently, wavefront aberrometer-based objective refraction technology is gaining popularity over the conventional refraction methods due to the ease of performing the evaluation and reproducibility of the clinical data. This novel method is touted to give repeatable results in few seconds of evaluation time. Studies comparing objective autorefractors and conventional objective and subjective refraction indicate that these autorefractors are satisfactory for a preliminary refraction, but are not satisfactory as substitutes for subjective refraction.[1] Many studies have shown strong agreement between autorefract and subjective refraction and less stronger agreement between wavefront aberrometer-based refraction and subjective refraction.[2]

In the following study titled “The Pentacam® AXL Wave provides a reliable wavefront-based objective refraction when compared to manifest subjective refraction: A prospective study,” the authors have attempted to prove the reliability of Pentacam® AXL Wave’s wavefront-based objective refraction vis-à-vis manifest refraction using a phoropter. This latest instrument launched by Oculus (Optikgeräte GmbH, Wetzlar, Germany) is based on Hartman Shack aberrometer principle combining Scheimpflug corneal tomography and partial coherence interferometry.[3] This type of aberrometers can identify various higher- and lower-order aberrations and convert these into vector representations in sphere, cylinder, and astigmatic errors based on Zernike polynomials.

The authors have used Thibos method of conversion of refraction values into power vectors for interpretation and analysis. Thibos, in his paper, in the year 2004, had himself concluded that there exist sources of error while converting wavefront aberration maps to refractive prescriptions, and thus suggested the need for future experiments that could resolve these uncertainties and achieve more accurate and precise method of objective wavefront refraction.[4] The authors have compiled the results well and gone in detail with the statistics to alleviate any bias; however, they have compared the wavefront aberrometry with subjective refraction using automated refractometer and phoropter-based evaluation. They have not performed retinoscopy under cycloplegia, which is considered gold standard in clinics all around the globe.

Not to forget the increasingly reported evidence of ectatic disorders like keratoconus in patients turning for refraction, in whom the subjective and aberrometry-derived spherical equivalent refraction data are noted to be significantly different. The larger the magnitude of the higher-order aberrations in keratoconic eyes, the poorer the subjective refraction LogMAR acuity and the larger the difference between the subjective and aberrometer-derived power vector terms.[5] Spectacle prescription in such patients cannot be relied upon completely based on the aberrometer-based objective methods of refractive error assessment.

Hence, from a personal perspective, we can conclude that it would have been more appropriate to compare this new method of aberrometer refraction with aberrometers which show good correlation with conventional refraction methods, as this would give us a better idea as to where this product stands in the current market. The ability to automatically refract a patient and provide a spectacle prescription, equivalent to the time-consuming current gold standard retinoscopy followed by subjective refraction, is an elusive goal, but definitely a step toward significant clinical advancement and, if proven superior, has the ability to introduce a revolution in the field of optometry and ophthalmology.

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