Subjective Quality of Vision

To the Editor:

We read with interest the study by Sia et al,1 which appeared in the January 2012 issue of the Journal of Refractive Surgery, comparing epi-LASIK and photorefractive keratectomy, particularly with regards to the questionnaire used to assess quality of vision. The questionnaire consisted of a 10-point scale ranging from 1 (no symptoms) to 10 (severe, disabling symptoms). The results found the subjective optical quality was the same between the two procedures for vision fluctuations, double vision, glare, light sensitivity, halos, starbursts, patient satisfaction, postoperative vision quality, and the chance to have the procedure again.

We would like to propose that a potential reason why no difference was found between the two procedures is the quality of the questionnaire, which has a number of flaws. First, with 10 response options per question, it is unlikely that respondents will be able to adequately differentiate 10 levels for each question, which will introduce error.2 Respondents typically use only 4 or 5 categories.3 Second, with ordinal response options (1, 2, 3...etc), the differences between each response may be unequal. Using a Rasch-scaled questionnaire would overcome this issue, as it provides a linear-estimated measure with a known step size between each response. Additional benefits of Rasch analysis in the context of questionnaire development and scoring are described elsewhere.4 Third, the questions asked may not represent the full extent of potential quality of vision symptoms. Potential questions should be derived from existing questionnaires, literature reviews, focus groups, and patient interviews. Lastly, the authors cited a study by Schallhorn et al5 after the description of their questionnaire, presumably to indicate they used the same questionnaire. However, the description does not appear to match the questionnaire used in the Schallhorn et al study.

We would encourage researchers wishing to investigate subjective quality of vision in future studies to apply a validated questionnaire scored using Rasch analysis, such as the Quality of Vision (QoV) questionnaire.6,7 This questionnaire consists of 10 questions and measures quality of vision with simulation photographs across the three scales: symptom frequency, severity, and bothersome nature. The QoV questionnaire has been shown to be highly sensitive to changes in quality of vision that occur over time after surface ablation6 and would have ideally suited the Sia et al study.

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Reply:

We thank McAlinden and coauthors for their interest in our article1 and we are eager to discuss their concerns regarding the findings of our study. McAlinden et al believe that the reason we did not find a significant difference in postoperative subjective optical quality (eg, vision fluctuations, double vision, glare, light sensitivity, halos, starbursts, patient satisfaction, postoperative vision quality, and the chance to have the procedure again) and patient satisfaction was because of the inadequate quality of the questionnaire. We respectfully disagree with these assertions and appreciate the opportunity to address them sequentially.

First, McAlinden et al believe the number of points that comprised our Likert scale (10) was in fact too many, patients could not adequately differentiate 10 levels for each question, and that ideally we should have used 4 to 5 categories. We disagree with this assertion for several reasons. The literature is rich with authors who claim that a Likert scale should consist of various X number of points.2 In the end, it depends on the goals of the study, the scientific question, and

REFERENCES

Letters to the Editor

the sample subjects. Our main concern entering the study was distinguishing between two similar surgical procedures. By confining the possible alternatives to 4 or 5 categories, a significant loss of statistical power may occur, and an inability to show a significant difference when one exists would result. With the large number of patients in our study, we believed variability would be beneficial, providing a more accurate reflection of our patients’ subjective assessments. The large (N) in our study would then result in much smaller standard deviations (SD), critical when determining statistical significance. Finally, we believed the large number of points of our Likert scales without an associated description for each point approximated a continuous variable and negating one of the hallmarks of ordinal data. We would like to point out that McAlinden et al, using the instrument that they developed in their previous study,3 a comparison between hyperopic and myopic laser-assisted subepithelial keratotomy utilizing their Rasch-scaled Quality of Vision (QoV) questionnaire, did not find a significant difference either. There is a much greater difference in surgical technique, ablation profile, and refractive correction between these two surgical procedures (hyperopic and myopic LASIK) than in myopic epi-LASIK and between these two surgical procedures (hyperopic and myopic LASEK) than in myopic epi-LASIK and photorefractive keratectomy.

Second, the instrument we used was derived from the questionnaire used by Schallhorn et al.5 At the time our study was done, the questionnaire scale structure had been examined and refined to include questions that were considered most relevant and to which statistical analysis of responses had the greatest correlation to associated clinical findings.6 Although respondents typically use only 4 or 5 categories, the change from the 5-point ordinal rating scale to a 10-point scale more closely approximates an interval scale. Also, the scale was assumed to be a multidimensional scale. The Rasch model works only with ordinal variables and is restricted by definition to a single dimension.7 The instrument we used was also shown to be reliable by a high level of internal consistency, and Cronbach’s α-coefficients were approximately 0.8 (PRK: μ=0.78, SD=0.05, range=0.74 to 0.83; epi-LASIK: μ=0.80, SD=0.04, range=0.76 to 0.86). Rasch-scaled questionnaire, such as the QoV, may be highly sensitive to changes in quality of vision over time in a within-group comparison; however, it might not offer any advantage over other validated questionnaires when seeking to compare subjective quality of vision changes between two or more refractive procedures.

IOL Scaffold Technique for Posterior Capsule Rupture

To the Editor:

We present a new technique called “IOL scaffold” to prevent nucleus drop without extending the original corneal incision. We used a three-piece foldable intraocular lens (IOL) as a “scaffold” for preventing the nucleus drop in soft to moderate nucleus after posterior capsular rupture (PCR).

When PCR occurs, anterior vitrectomy is performed through the main port with the vitrectomy cutter. A viscoelastic substance is injected into the anterior chamber and the nuclear fragments are brought into the anterior chamber. An anterior chamber maintainer or transconjunctival 23-gauge trocar cannula is used for infusion during the procedure. A three-piece foldable IOL is then injected via the injector through the existing corneal wound and maneuvered below the nucleus (Fig). The leading haptic of the IOL is posi-
tioned on the iris and the trailing haptic is placed in the incision site. The IOL is positioned to block the pupillary zone. The nucleus fragment is emulsified with the phaco probe by traditional longitudinal phaco-emulsification (see Fig). Once the anterior chamber is cleared of nucleus/epinucleus fragments, the cortex is removed with a phaco probe (low vacuum 150 mmHg) in aspiration mode. The IOL is positioned on the capsule in the ciliary sulcus. The corneal wound is closed with a suture (10-0 monofilament).

We have performed this method in 12 eyes, including 6 eyes with 50% nucleus, 4 eyes with 30% nucleus, and 2 eyes with 80% epinucleus remaining for phacoemulsification when PCR occurred. Significant improvement was noted in uncorrected visual acuity ($P=0.002$, Wilcoxon test). Postoperative corrected visual acuity of 20/20 was obtained in 9 eyes. No significant change occurred in the intraocular pressure ($P=0.136$). Mean endothelial cell loss was 4±1.2%. Immediate postoperative complications included grade 2 anterior chamber reaction (2 eyes) and minimal corneal edema (3 eyes).

Although this technique may be controversial, we believe it has some advantages over the usual methods to manage such conditions, including the conversion of phacoemulsification to extracapsular cataract extraction,\textsuperscript{1,2} or the use of Sheet’s glide to deliver the nucleus.\textsuperscript{3} In eyes with nucleus displaced in the anterior vitreous, Viscoat (Alcon Laboratories Inc, Ft Worth, Texas) posterior assisted levitation\textsuperscript{4} is performed followed by nucleus emulsification with the phacoprobe above a trimmed sheet’s glide. In the above conditions, corneal wound extension is required, which can increase the risk of postoperative suture-induced astigmatism. When a HEMA contact lens life boat is used after PCR,\textsuperscript{5} it must be removed after nucleus emulsification. However, in the IOL scaffold technique, there is no need for IOL removal or corneal wound extension, which reduces the chance of induced astigmatism. The foldable IOL acts as a barrier to nucleus pieces dropping into the vitreous and works like an artificial posterior capsule. In addition, the possibility of the IOL falling into the vitreous is unlikely because one haptic remains outside the eye. Although techniques are available to prevent nucleus fragment from descending into the vitreous after intraoperative PCR,\textsuperscript{2,4,6} this method of using the foldable IOL as a scaffold has not been reported previously.

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REFERENCES