

LETTERS

Comment on: Refractive and keratometric outcomes of supervised novice surgeon performed limbal relaxing incisions



We read with great interest the article by Riaz et al.¹ The authors evaluated the efficacy and safety of astigmatism management using limbal-relaxing incisions performed by refractive surgeons in training. This study provides a reference for the performance of systematic astigmatism incisions in cataract surgery patients by ophthalmology residents. We would like to address some considerations regarding the vector analysis of astigmatism.

The Alpains method has been established as the gold standard for reporting astigmatism outcomes following refractive surgery.^{2,3} Both the *Journal of Refractive Surgery* and the *Journal of Cataract & Refractive Surgery* suggest using the Alpains method together with the recommendations of Abulafia et al.^{3–5} In the study by Riaz et al., although Alpains terminology is used to discuss astigmatism outcomes, the term surgically induced astigmatism (SIA) does not accurately reflect Alpains' original term.¹ Alpains defines the SIA as the amount and direction of corneal steepening that occurred in achieving the operative result from the preoperative astigmatic state.⁶ Consequently, the SIA vector could take any orientation as it does not depend directly on the target-induced astigmatism (TIA) meridian. Similarly, the term SIA_{cornea} suggested by Abulafia et al. describes the change in total corneal astigmatism and does not consider the surgical meridian.⁵ However, Riaz et al. used the term SIA as a with-the-wound (WTW) and against-the-wound (ATW) change, using the steep corneal meridian as the reference.¹ The WTW-ATW change represents the difference between the flattening that occurs in the surgical meridian and the steepening induced in the orthogonal meridian. This terminology could be confusing as it does not represent the original term SIA. First, this is because the WTW-ATW change is a magnitude closely related to the surgical meridian and it cannot be called SIA. Second, WTW-ATW change is outdated terminology, used for the first time in 1992, which does not characterize the actual visual and refractive outcomes as does the standard terminology.⁷ The keratometric change that occurs in the steep corneal meridian could be expressed by the flattening effect (FE) according to the terminology used by Alpains instead of the WTW-ATW change proposed by Holladay et al. or the term surgically induced astigmatic polar value proposed by Naeser et al.^{7,8}

In addition, the authors suggest undercorrection of astigmatism. However, we found no measures that suggest overcorrection or undercorrection of astigmatism regarding the TIA. To make this assertion, the SIA should be evaluated in relation to the TIA. This information has traditionally been reported through standard graphs to illustrate astigmatic treatment.³ Several studies have reported the correction index (CI) to represent treatment success. The CI is defined as the magnitude of the SIA divided by TIA. When the magnitude

of the SIA is less than that of the TIA, this indicates that the intended astigmatic correction has not been achieved and the CI is less than 1.0. Conversely, if the SIA value is greater than that of the TIA, this suggests a CI greater than 1.0. A CI equal to 1 is ideal. Although this ratio has been widely used to report the outcomes of astigmatism correction, we do not believe this is entirely correct because it only represents the magnitude of the association between SIA and TIA but does not consider the orientation of both vectors. We suggest using the flattening index (FI) as the true relation between the SIA and TIA vectors. The FI is the ratio of the FE to the TIA. The FE is the projection of the SIA vector onto the TIA meridian. This concept is more accurate since the FE and the TIA are 2 vectors with the same orientation, and their magnitude can be directly compared. Research on the visual and refractive outcomes of astigmatism treatment would improve with the use of the FI because of the vectorial nature of astigmatism.

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