Changes in the Accommodative-Vergence System Following FemtoLASIK and SMILE

Refractive Surgery

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Summary

Laser vision correction effectively eliminates refractive errors and improves visual acuity; however, some patients continue to report postoperative visual discomfort. Evidence suggests that these symptoms may be related to changes in accommodative and binocular vision function. This study evaluates accommodative and vergence parameters one month after laser vision correction and compares outcomes between FemtoLASIK and SMILE. Thirty myopic adults were examined before surgery and one month postoperatively. Preliminary observations indicate changes primarily in accommodative amplitude and facility, with additional alterations in ocular alignment in some patients.

Keywords: laser vision correction; accommodation; binocular vision; vergence; FemtoLASIK; SMILE; visual discomfort

INTRODUCTION

Laser refractive surgery has become a standard method for correcting myopia, offering high predictability and excellent postoperative visual acuity. FemtoLASIK and SMILE are currently considered gold-standard techniques, differing primarily in their level of corneal invasiveness and postoperative recovery profiles. Despite successful refractive outcomes and the absence of surgical complications, some patients report persistent visual symptoms, particularly during near tasks.

Previous studies suggest that these complaints may be related to dysfunctions of accommodation and binocular vision rather than residual refractive error. Changes in accommodative amplitude, facility, vergence ranges, or phoria may compromise visual comfort, especially in patients previously dependent on spectacle correction, where prismatic effects contributed to binocular balance. However, comparative data on accommodative–vergence function following different laser surgery techniques remain limited. This study addresses this gap by evaluating functional visual parameters before and after FemtoLASIK and SMILE procedures.

METHODS

The study includes 30 myopic participants aged 18–37 years, with refractive errors ranging from −0.50 D to −8.00 D. Participants were recruited from patients undergoing laser vision correction at a specialized ophthalmic clinic. Fifteen patients underwent FemtoLASIK and fifteen underwent SMILE.

All participants underwent a comprehensive optometric examination during the preoperative qualification visit and again one month after surgery. The assessment included best-corrected distance and near visual acuity, cover test at distance and near, measurement of distance and near phoria using prism cover test and the Thorington test, near fusional vergence ranges, accommodative amplitude (push-up method), and accommodative facility (±2.00 D flipper monocularly and binocularly).

Patients with manifest strabismus, amblyopia, significant anisometropia (>3.00 D), diplopia, postoperative complications, or medication affecting the autonomic nervous system were excluded. Statistical analysis will be performed using tests for dependent and independent samples to evaluate changes over time and differences between surgical techniques.

RESULTS

Preliminary findings suggest that the most notable postoperative changes occur in accommodative amplitude and accommodative facility. In several participants, alterations in ocular alignment (phoria) were observed, potentially related to the elimination of the prismatic effect previously induced by spectacle correction. Differences between the FemtoLASIK and SMILE groups are under further analysis. Final statistical results will be presented upon completion of data collection.

CONCLUSIONS

Early observations indicate that laser vision correction may influence accommodative and binocular vision function, even in patients without preoperative binocular disorders. These changes may contribute to postoperative visual discomfort despite excellent refractive outcomes. Understanding functional differences between FemtoLASIK and SMILE may support more comprehensive preoperative screening and guide the development of vision therapy protocols aimed at improving postoperative visual comfort and recovery.

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