

INPLASY

Longitudinal Changes in Epithelial Thickness After SMILE, FS-LASIK, and Transepithelial PRK: A Systematic Review and Meta-Analysis

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ADMINISTRATIVE INFORMATION

Support - N/A.

Review Stage at time of this submission - Formal screening of search results against eligibility criteria.

Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 21 January 2025 and was last updated on 21 January 2025.

INTRODUCTION

Review question / Objective Population (P): Patients undergoing corneal refractive surgeries.

Intervention (I): This includes three specific types of corneal refractive surgeries:

Transepithelial Photorefractive Keratectomy (tPRK)

Laser In-Situ Keratomileusis (LASIK)

Small incision lenticule extraction (SMILE)

Comparison (C): Compare the corneal epithelial thickness changes among the three surgical methods.

Outcome (O): The primary outcome is the rate and pattern of epithelial thickness remodeling across the different surgeries, as measured by spectral-domain optical coherence tomography (SD-OCT).

Study Design (S): Systematic review and meta-analysis of studies that have measured epithelial thickness changes post-refractive surgery using SD-OCT.

Condition being studied Corneal refractive surgeries are surgical procedures that alter the shape of the cornea to correct vision problems such as myopia and myopic astigmatism. Central to the success of these surgeries is the corneal epithelium. Following refractive surgery, the corneal epithelium undergoes a process known as epithelial remodeling, where it adjusts its thickness and cellular composition in response to the altered corneal shape. This remodeling is critical as it helps to stabilize the new corneal contour and thus is integral to achieving the desired refractive outcome and maintaining long-term corneal health. Abnormalities in this remodeling process can lead to suboptimal visual outcomes and complications. This systematic review and meta-analysis focus on comparing the rates and patterns of epithelial thickness changes following different types of corneal refractive surgeries – specifically, Transepithelial Photorefractive Keratectomy (tPRK), Laser In-Situ Keratomileusis (LASIK), and Small Incision Lenticule Extraction (SMILE). Understanding these patterns is essential for

optimizing surgical techniques and postoperative care to enhance visual recovery and outcomes.

METHODS

Participant or population Patients received Transepithelial Photorefractive Keratectomy (tPRK), Laser In-Situ Keratomileusis (LASIK), or Small Incision Lenticule Extraction (SMILE).

Intervention Transepithelial Photorefractive Keratectomy (tPRK), Laser In-Situ Keratomileusis (LASIK), or Small Incision Lenticule Extraction (SMILE).

Comparator N/A.

Study designs to be included case series of at least 10 operated eyes, observational studies and randomized controlled trials.

Eligibility criteria Study data on epithelial thickness should be measured by SD-OCT, and the included studies should contain data on central epithelial thickness preoperatively and at 1 week, 1 month, 3 months, or 6 months postoperatively.

Information sources 1. database: Pubmed, Embase, CENTRAL 2. grey literature.

Main outcome(s) Changes in epithelial thickness in the central, paracentral, midperipheral, and peripheral cornea at 1 week, 1 month, 3 months, and 6 months postoperatively following the three refractive surgical procedures.

Quality assessment / Risk of bias analysis Cochrane Risk of Bias tool, Newcastle-Ottawa Scale, and methodological index for non-randomized studies.

Strategy of data synthesis Meta-analysis was performed using a random-effects model. Restricted Maximum Likelihood estimation meta-regression was used to build multivariate models to assess the influence of variables on outcomes, where sufficient data were available.

Subgroup analysis N/A.

Sensitivity analysis N/A.

Country(ies) involved Taiwan.

Keywords Epithelial thickness; remodeling; tPRK; LASIK; SMILEcc.

Contributions of each author

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Author 2 - Ling-Shuo Chang.

Author 3 - Jui-Hung Hsu.Tsai