Efficacy, safety, predictability and stability of LASIK for presbyopia correction: A systematic review and meta-analysis

Zhang, GH¹; Cao, HX²; Qu, C³.

Review question / Objective: This meta-analysis was aimed to statistically analyze the efficacy, safety, predictability, and stability of LASIK in presbyopia correction. At the same time, through subgroup analysis, we compared the effects of different corneal ablation models and different corneal flap preparation methods to a certain extent.

Condition being studied: Presbyopia refers to the decline of age-related accommodation ability, which usually leads to impaired near vision and asthenopia. It is estimated that nearly 1.8 billion people will have presbyopia by 2050, most of whom will live in developing countries. Presbyopia develops inevitably and irreversibly, and with the increasing pressure of close or medium distance reading or working on a variety of electronic devices, presbyopia has become one of the major physiological problems that patients want to solve.

INPLASY registration number: This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 01 May 2023 and was last updated on 01 May 2023 (registration number INPLASY202350005).

INTRODUCTION

Review question / Objective: This meta-analysis was aimed to statistically analyze the efficacy, safety, predictability, and stability of LASIK in presbyopia correction. At the same time, through subgroup analysis, we compared the effects of different corneal ablation models and different corneal flap preparation methods to a certain extent.

Condition being studied: Presbyopia refers to the decline of age-related accommodation ability, which usually leads to impaired near vision and asthenopia. It is estimated that nearly 1.8 billion people will...
have presbyopia by 2050, most of whom will live in developing countries. Presbyopia develops inevitably and irreversibly, and with the increasing pressure of close or medium distance reading or working on a variety of electronic devices, presbyopia has become one of the major physiological problems that patients want to solve.

**METHODS**

**Participant or population:** Presbyopia patients, the corrected distance visual acuity (CDVA) and corrected near visual acuity (CNVA) ≤ 0.1 logMAR (20/25).

**Intervention:** Intervention measure was LASIK, including models of monovision, Q-value-guided, multifocal corneal ablation, and laser blended vision.

**Comparator:** No control group or compared to preoperative.

**Study designs to be included:** RCT or self-controlled trial.

**Eligibility criteria:**

- **Inclusion Criteria:**
  1. Presbyopia patients, the corrected distance visual acuity (CDVA) and corrected near visual acuity (CNVA) ≤ 0.1 logMAR (20/25).
  2. Intervention measure was LASIK, including models of monovision, Q-value-guided, multifocal corneal ablation, and laser blended vision;
  3. Outcomes: effectiveness, safety, predictability, and stability.

- **Exclusion Criteria:**
  1. Articles published repeatedly or without valuable data;
  2. Reviews, experience summaries, animal experiments, case reports, conferences, meta-analysis, marginal journals, etc.;
  3. Anterior segment and fundus diseases, history of strabismus surgery, family history of glaucoma, diabetes, systemic connective tissue diseases and severe autoimmune diseases;
  4. Follow-up period was less than 3 months.

**Information sources:** A systematically electronic literature search was conducted using the databases of PubMed, Cochrane Library, Web of Science and EMBASE and ClinicalTrials.gov in English and the CNKI.

**Main outcome(s):** Outcomes: effectiveness, safety, predictability, and stability

**Quality assessment / Risk of bias analysis:** Cochrane Collaboration’s risk-of-bias method for RCTs and MINORS for non-RCTs.

**Strategy of data synthesis:** The forest plots and funnel plots were drawn by STATA15.0 software. The count data were expressed by relative risk (RR) and its 95% confidence interval (CI). The measurement data are expressed by weighted mean difference (WMD) and its 95% CI. Statistically, P < .05 showed that there is significant difference, and vice versa. Heterogeneity test criteria: when I² < 50% and P > .10, it indicated that the heterogeneity was not significant, and the fixed effect model was used to combine the effect; when I² > 50% and P < .10, the heterogeneity was considerable, and the random effect model was used to combine the effect.

**Subgroup analysis:** Subgroup analysis: different subgroups were performed based on corneal ablation model and method of corneal flap preparation.

**Sensitivity analysis:** Sensitivity analysis: when there is a considerable heterogeneity, it is necessary to explore the source of the heterogeneity through sensitivity analysis, and verify the stability and reliability of the meta-analysis results. When the results are unstable, the research results need to be interpreted carefully.

**Country(ies) involved:** China.

**Keywords:** LASIK, presbyopia, efficacy, safety, predictability, stability.
Contributions of each author:
Author 1 - Guanghong Zhang.
Email: shiyi1987@foxmail.com
Author 2 - Haixing Cao.
Author 3 - Chao Qu.