Comparison of laser epithelial keratomileusis and photorefractive keratectomy for the correction of myopia: a meta-analysis

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CRD summary
The review concluded that there was no definitive evidence that laser epithelial keratomileusis (LASEK) was better than photorefractive keratectomy (PRK) for correcting myopia from 0 to -9.0 dioptres. The review had some methodological weaknesses, but the authors’ conclusion is likely to be reliable given the evidence available.

Authors’ objectives
To compare the efficacy, accuracy, safety and side-effects of laser epithelial keratomileusis (LASEK) and photorefractive keratectomy (PRK) for the correction of myopia.

Searching
PubMed, EMBASE, Chinese Bio-medicine Database and Cochrane Central Register of Controlled Trials (CENTRAL) were searched from inception to November 2007 for publications in English and Chinese. Search terms were reported.

Study selection
Randomised controlled trials (RCTs) that compared LASEK with PRK in patients aged 18 to 60 years with any degree of myopia and astigmatism of up to three dioptres were eligible for inclusion. Outcomes of interest included efficacy outcomes (proportion of eyes with uncorrected visual acuity (UCVA) ≥20/20 at one month and 12 months post-treatment), accuracy outcomes (proportion of eyes within ±0.50 dioptres of target refraction at one month and 12 months post-treatment), safety outcomes (loss of ≥2 lines of best spectacle-corrected visual acuity (BSCVA) at six months or more post-treatment), pain scores on day one post-treatment and corneal haze scores at six and 12 months post-treatment.

Mean preoperative spherical equivalent refraction was -3.39 for LASEK and -4.37 for PRK. Mean age of patients was 27.8 years. Outcomes reported included efficacy, accuracy and safety outcomes and mean pain and mean corneal haze scores. The laser systems used were varied.

The authors stated neither how the papers were selected for review nor how many reviewers performed the selection.

Assessment of study quality
Study quality was assessed by adequacy of allocation concealment, randomisation, masking, intention-to-treat-analysis and descriptions of withdrawals or dropouts.

Two reviewers independently assessed study quality using a standardised form and resolved any disagreements by discussion.

Data extraction
Data on efficacy, accuracy and safety measures and on the degree of reported side-effects were extracted in order to calculate odds ratios (ORs) and corresponding 95% confidence intervals (CIs).

Two reviewers independently extracted data and any disagreements were resolved by discussion. Authors were contacted for missing data.

Methods of synthesis
Mean pain and corneal haze scores were combined by calculating weighted mean differences (WMDs) and corresponding 95% CIs. Pooled odds ratios and corresponding 95% CIs were calculated for dichotomous outcomes.
using a random-effects model. Statistical heterogeneity was assessed using the Q test (p<0.10). Potential for publication bias was assessed visually using funnel plots.

**Results of the review**

Seven RCTs were included (n=604 eyes, 302 patients). Methodological quality varied between studies: four studies were double-blind (n=336 eyes); two were single-blind (n=214 eyes); and one was open-label (n=214 eyes). Only two studies reported patient withdrawals or dropouts. Analyses were by intention-to-treat in all studies. Study durations ranged from three to 24 months.

**Efficacy measures:** At one month post-treatment, there was no statistically significant difference between LASEK and PRK groups in proportion of eyes with UCVA ≥20/20 (OR 0.93, 95% CI 0.45 to 1.93, p=0.85; four RCTs, 280 eyes). At 12 months post-treatment, there was no statistically significant difference between LASEK and PRK groups in proportion of eyes with UCVA ≥20/20 (OR 1.29, 95% CI 0.73 to 2.28, p=0.38; two RCTs, 240 eyes).

**Accuracy measures:** At one month post-treatment, there was no statistically significant difference between the two groups in proportion of eyes within ±0.50 dioptres of the target refraction (OR 1.23, 95% CI 0.81 to 1.89, p=0.33; four RCTs, 414 eyes). At 12 months post-treatment, there was no statistically significant difference between the two groups in proportion of eyes within ±0.50 dioptres of the target refraction (OR 1.59, 95% CI 0.88 to 2.88, p=0.12; two RCTs, 334 eyes).

**Safety measures:** No patient lost ≥2 lines of BSCVA at ≥6 months post-treatment (n=4 RCTs, 432 eyes).

**Side-effects:** There was no statistically significant difference between the two groups in mean pain scores (WMD -0.42, 95% CI -0.85 to 0.02, p=0.06; nine RCTs, 414 eyes). At six months post-treatment, there was no statistically significant difference between the two groups in mean corneal haze scores (WMD -0.17, 95% CI -0.36 to 0.02, p=0.07; four RCTs, 406 eyes). At 12 months post-treatment, there was no statistically significant difference between the two groups in mean corneal haze scores (WMD -0.06, 95% CI -0.17 to 0.06, p=0.33; three RCTs, 340 eyes).

**Authors' conclusions**

There was no conclusive evidence that LASEK was better than PRK for correcting myopia from 0 to -9.0 dioptres.

**CRD commentary**

The review addressed a clear question with well-defined inclusion criteria. Relevant databases were searched. Relevant papers may have been missed as only papers published in English or Chinese were considered and no supplementary searches were conducted. Steps were taken to minimise reviewer error and bias in data extraction and quality assessment, but not explicitly with study selection. No attempts were made to identify unpublished data and publication bias was not assessed; the possibility of publication bias could not be ruled out. Methods used to combine data and account for statistical heterogeneity were appropriate and justified. The authors' conclusion reflected the evidence presented and is likely to be reliable, but potential for publication bias and poor reporting of review processes suggests a need for some caution.

**Implications of the review for practice and research**

**Practice:** The authors did not state any implications for practice.

**Research:** The authors stated that further studies that compared the long-term (at least one year) efficacy and safety of LASEK and PRK using modern equipment and techniques were needed.

**Funding**

Not stated.

**Bibliographic details**

This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.