Effect of AcrySof versus silicone or polymethyl methacrylate intraocular lens on posterior capsule opacification

Li N, Chen X, Zhang J, Zhou Y, Yao X, Du L, Wei M, Liu Y

CRD summary
The authors concluded that AcrySof and sharp-edged silicone intraocular lenses (IOLs) were comparable in inhibition of posterior capsule opacification in senile cataract surgery, while AcrySof was more effective than round-edged silicone or polymethyl methacrylate (PMMA) IOLs. This conclusion reflects the evidence with respect to round-edged silicone or PMMA (and these aspects may be reliable), but not sharp-edged silicone IOLs.

Authors’ objectives
To assess the impact of AcrySof intraocular lenses (IOLs) compared with silicone or polymethyl methacrylate (PMMA) IOLs on the development of posterior capsule opacification (PCO) in patients with senile cataracts.

Searching
PubMed, EMBASE, Chinese Biomedicine database and Cochrane Controlled Trials Register were searched from 1966 to June 2006. Search terms were reported. Only studies published in English or Chinese were eligible for inclusion. Abstracts without retrievable raw data were excluded from the review.

Study selection
Randomised controlled trials (RCTs) comparing AcrySof IOLs with silicone or PMMA IOLs in patients with senile cataract undergoing cataract surgery were eligible for inclusion. Primary review outcomes were PCO score, Neodymium:Yttrium-Aluminum-Garnet (Nd:YAG) capsulotomy rate, and number of eyes with best-corrected visual acuity (BCVA) of 0.5 or better.

Included studies mainly used phacoemulsification, with a minority of surgeries involving conventional extracapsular cataract extraction (ECCE). A variety of methods were used to analyse PCO. Both sharp-edged and round-edged silicone IOLs and PMMA IOLs were used as control interventions. The majority of patients were women. Mean ages ranged from 55 to 78 years.

Two reviewers independently assessed the studies for inclusion.

Assessment of study quality
Two reviewers independently assessed the studies for validity using the following criteria: randomisation, allocation concealment, blinding, withdrawals and dropouts, intention-to-treat (ITT) analysis and sample size calculation. Differences were resolved through consensus.

Data extraction
Two reviewers independently performed the data extraction using a customised form. Differences were resolved through consensus. Odds ratios (ORs) with 95% confidence intervals (CIs) were calculated for dichotomous variables and mean differences with 95% CIs for continuous variables.

Methods of synthesis
The studies were combined in meta-analyses for each variable. For dichotomous variables a pooled OR with 95% CI was calculated. For continuous variables a weighted mean difference (WMD) or standard mean difference (SMD) with 95% CI was calculated. Statistical heterogeneity between the studies was assessed using a $X^2$ test and the $I^2$ statistic. If statistically significant heterogeneity was detected a random-effects model was employed, otherwise a fixed-effect model was adopted. Subgroup analysis was used to assess the impact of IOL materials, edge designs (round versus sharp) and surgery (ECCE versus phacoemulsification). Assessment of publication bias using a funnel plot was planned, but the number of studies was insufficient.
Results of the review
Ten RCTs including a total of 1,202 eyes were included in the review. Study validity was limited with only one RCT being double blinded, one reporting a sample size calculation and none an ITT analysis.

AcrySof versus silicone IOLs: AcrySof IOLs were statistically significantly inferior to sharp-edged silicone IOLs in the development of PCO (SMD 0.48, 95% CI: 0.29, 0.68, p < 0.00001, four RCTs) with no evidence of heterogeneity. However, AcrySof IOLs were statistically significantly superior to round-edged silicone IOLs (SMD -0.25, 95% CI: -0.42, -0.08, p = 0.003, six RCTs) with high levels of heterogeneity. AcrySof IOLs had a statistically significantly lower Nd:YAG capsulotomy rate than round-edged silicone IOLs (OR 0.29, 95% CI 0.14, 0.62, P = 0.001, five RCTs) but did not differ significantly from sharp-edged silicone IOLs (three RCTs). There was no significant statistical heterogeneity in either analysis. There was no significant difference in visual acuity between AcrySof and round edged silicone IOLs with no heterogeneity in the analysis (three RCTs).

AcrySof versus PMMA IOLs: AcrySof IOLs were statistically significantly superior to round-edged PMMA IOLs in the inhibition of PCO (SMD -1.07, 95% CI: -1.29, -0.85, p < 0.00001, four RCTs). AcrySof IOLs had a statistically significantly lower Nd:YAG capsulotomy rate than round-edged PMMA IOLs (OR 0.09, 95% CI: 0.04, 0.20, p < 0.00001, four RCTs). There was no statistically significant difference in visual acuity between the groups (two RCTs). There was no evidence of heterogeneity in any of these analyses.

Authors’ conclusions
AcrySof and sharp-edged silicone IOLs are similarly effective in inhibition of PCO after cataract surgery, and AcrySof is more effective than round-edged silicone or PMMA IOLs.

CRD commentary
The review question and inclusion criteria were clearly defined. The authors searched a number of relevant databases, but the decision to restrict the review to published studies reported in English or Chinese may have led to the exclusion of some relevant studies and the introduction of publication or language bias. A planned analysis of publication bias could not be undertaken due to low study numbers. The authors used rigorous methodology at all stages of the review process and conducted an appropriate validity assessment. The decision to employ meta-analysis appeared appropriate and reasonable steps to identify and explore heterogeneity were taken, although overall analysis results were not reported. The authors’ conclusions only partly reflect the results of the review: they state that AcrySof and sharp-edged silicone IOLs were equivalent in the inhibition of PCO, when the sharp-edged silicone IOLs were significantly more effective. The remainder of the conclusions may be reliable.

Implications of the review for practice and research
The authors did not state any implications for practice or further research.

Funding
Not stated.

Bibliographic details

Indexing Status
Subject indexing assigned by NLM

MeSH
Acrylic Resins; Aged; Cataract /prevention & control; Female; Humans; Laser Therapy /statistics & numerical data; Lens Capsule, Crystalline /pathology /surgery; Lens Implantation, Intraocular; Lenses, Intraocular; Male; Middle Aged; Phacoemulsification; Polymethyl Methacrylate; Postoperative Complications; Prosthesis Design; Randomized Controlled Trials as Topic; Silicone Elastomers; Visual Acuity

AccessionNumber
Date bibliographic record published
23/12/2008

Date abstract record published
07/04/2009

Record Status
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.