Meta-analysis of viscocanalostomy versus trabeculectomy in uncontrolled glaucoma

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CRD summary
The review found that trabeculectomy had a significantly greater pressure-lowering effect than viscocanalostomy, but viscocanalostomy had a significantly better risk profile. The authors' conclusions reflected the evidence base, but variation in the included studies means the conclusions should be considered tentative.

Authors' objectives
To compare the efficacy and safety of viscocanalostomy with trabeculectomy in uncontrolled glaucoma.

Searching
Science Direct, PubMed and The Cochrane Library were searched for relevant studies. There were no language restrictions. Search terms were reported for MEDLINE/PubMed.

Study selection
Eligible studies were randomised controlled trials (RCTs) that compared trabeculectomy and viscocanalostomy in treatment of uncontrolled glaucoma in adults. Trials were required to have measured either efficacy or adverse events or both.

In the included studies, mean age of participants ranged from 60 to 68 years. Where reported, 42% of the participants were male and 34% were female. Where reported, 53% of the affected eyes were from white participants and 26% were from non-white participants. Where reported, 81% of affected eyes had primary open angle glaucoma, 16% had secondary open angle glaucoma and 2% had primary chronic angle closure glaucoma. Some participants contributed both eyes to the analyses; most participants had only one affected eye. Outcomes included: mean intraocular pressure difference between groups at six, 12 and 24 months postoperatively; mean number of antiglaucomatous medications after a postoperative period of one year or more; and adverse events (chosen after the studies were retrieved) such as perforation of Descemet membrane hypotony, hyphema, shallow anterior chamber and cataract formation. Studies were in Germany, Italy, UK, Japan and Turkey.

Two reviewers selected studies for the review. Disagreements were resolved by discussion and consensus with a third reviewer.

Assessment of study quality
Trials were assessed for quality. Criteria included allocation concealment, proportion of withdrawals, mean follow-up and whether the same surgeon performed surgery in both of the randomised groups.

Quality assessments were performed by one reviewer and double checked by another.

Data extraction
Data were extracted using a standardised format. Mean differences (MDs) for continuous data and risk ratios (RRs) for dichotomous data were calculated, together with their 95% confidence intervals.

Data extraction was performed by one reviewer and double-checked by another. Disagreements were resolved by discussion and consensus with a third reviewer.

Methods of synthesis
Studies were pooled in meta-analyses and summary effect measures (MDs and RRs) were calculated with 95% CIs using a fixed-effect model. Heterogeneity was assessed with the $X^2$ statistic and quantified by the $I^2$ value. Subgroup analyses were performed to assess summary effects in intraocular pressure studies that included only one eye per
patient, studies where participants were all white, studies with participants with primary open-angle glaucoma, studies without use of intraoperative mitomycin C in the trabeculectomy group, studies without postoperative antimetabolite and studies with and without post-viscocanalostomy neodymium-doped yttrium aluminium garnet (Nd:YAG) gonipuncture. Publication bias was assessed by generating a funnel plot.

Results of the review

Ten RCTs (458 eyes in 397 patients) were included in the review. Allocation concealment was adequate in six studies. Withdrawals ranged from 2% to 17% (where reported). The same surgeon performed both surgeries in six studies. Follow-up ranged from six months to 3.3 years.

**Efficacy:** Trabeculectomy was associated with a significantly lower mean intraocular pressure at six, 12 and 24 months when compared to viscocanalostomy (six months MD 2.25mmHg, 95% CI 1.38 to 3.12; eight studies, 12 months MD 3.64mmHg, 95% CI 2.74 to 4.54; six studies and 24 months MD 3.42mmHg, 95% CI 1.80 to 5.03; three studies).

Trabeculectomy was consistently superior to viscocanalostomy in all subgroup analyses. Trabeculectomy was associated with significantly fewer antiglaucomatous medications postoperatively than viscocanalostomy (MD 0.93, 95% CI 0.81 to 1.04; four studies). Substantial heterogeneity was identified for the six-month overall analysis of intraocular pressure (and some subgroup analyses) and number of medications.

**Safety:** Viscocanalostomy had a significantly higher risk of perforation of Descemet membrane than trabeculectomy (RR 7.72, 95% CI 2.37 to 25.12; six studies). Viscocanalostomy had a significantly lower risk of other adverse events (hypotony RR 0.29, 95% CI 0.15 to 0.58; nine studies, hyphema RR 0.50, 95% CI 0.30 to 0.84; nine studies, shallow anterior chamber RR 0.19, 95% CI 0.08 to 0.45; nine studies and cataract formation RR 0.31, 95% CI 0.15 to 0.64; eight studies). No heterogeneity was identified in any of the safety analyses.

A funnel plot of the difference in intraocular pressure did not suggest potential for publication bias.

Authors’ conclusions

Trabeculectomy was found to have a significantly greater pressure-lowering effect than viscocanalostomy, but viscocanalostomy had a significantly better risk profile.

CRD commentary

The review addressed a clear research question. Inclusion criteria appeared appropriate. Various sources were searched for relevant studies. There were no language restrictions. The authors used appropriate search terms. No attempts were made to locate unpublished studies. Formal assessment of publication bias using a funnel plot of the difference in intraocular pressure suggested that publication bias was unlikely. One reviewer undertook study selection, validity assessment and data extraction; the results of these processes were checked by another reviewer until consensus was reached, but the authors did not state whether the checking was done independently. Most of the included studies had adequate allocation concealment and used the same surgeon for both procedures (within each study). Information on withdrawals was scarce and no other quality criteria were measured, so assessments of overall study quality were limited.

Studies were synthesised appropriately using meta-analysis (fixed-effect model). Evidence of substantial heterogeneity was explored in subgroup analyses. Some participants had two affected eyes and the overall analysis used participants as the unit of analysis, although it was likely that both affected eyes contributed measurements. Subgroup analysis of studies that included only patients with one affected eye did not alter the overall findings substantially, but heterogeneity persisted in some subgroup analyses. The authors acknowledged that differences in technique and skill in the surgeons who performed the procedures may have contributed to the heterogeneity. There was variable follow-up. Included participants had different types of glaucoma. Subgroup analyses confirmed the overall findings.

The authors’ conclusions reflected the evidence base, but variation in the included studies means the conclusions should be considered tentative.

Implications of the review for practice and research

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Practice: The authors stated that the results from the review may not be generalised to patients with other forms of glaucoma, such as angle closure glaucoma. They stated that the treatment modality selected should be individualised and take into consideration the severity of glaucoma and the patient's risk factors for complications.

Research: The authors stated that more studies were required with longer follow-up.

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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.