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[Intervention Review]

Surgery for postvitrectomy cataract

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ABSTRACT

Background

Cataract formation or acceleration can occur after intraocular surgery, especially following vitrectomy, a surgical technique for removing the vitreous that is used in the treatment of many disorders that affect the posterior segment of the eye. The underlying problem that led to vitrectomy may limit the benefit from removal of the cataractous lens.

Objectives

To evaluate the effectiveness and safety of surgery versus no surgery for postvitrectomy cataract with respect to visual acuity, quality of life, and other outcomes.

Search methods

We searched the Cochrane Central Register of Controlled Trials (CENTRAL) (which contains the Cochrane Eyes and Vision Trials Register) (2017, Issue 5), MEDLINE Ovid (1946 to 17 May 2017), Embase.com (1947 to 17 May 2017), PubMed (1946 to 17 May 2017), Latin American and Caribbean Health Sciences Literature database (LILACS) (January 1982 to 17 May 2017), the *metaRegister of Controlled Trials* (*mRCT*) (www.controlled-trials.com); last searched May 2013, ClinicalTrials.gov (www.clinicaltrials.gov); searched 17 May 2017, and the World Health Organization (WHO) International Clinical Trials Registry Platform (ICTRP) (www.who.int/ictcp/search/en); searched 17 May 2017. We did not use any date or language restrictions in the electronic searches for trials.

Selection criteria

We planned to include randomized controlled trials (RCTs) and quasi-RCTs that had compared surgery versus no surgery to remove the lens from eyes of adults in which cataracts had developed following vitrectomy.

Data collection and analysis

Two review authors independently screened the search results according to the standard methodological procedures expected by Cochrane.

Main results

We found no RCTs or quasi-RCTs that had compared surgery versus no surgery to remove the lens from eyes of adults in which cataracts had developed following vitrectomy.

Authors' conclusions

There is no evidence from RCTs or quasi-RCTs on which to base clinical recommendations for surgery for postvitrectomy cataract. There is a clear need for RCTs to address this evidence gap. Such trials should stratify participants by their age, the retinal disorder leading to vitrectomy, and the status of the underlying disease process in the contralateral eye. Outcomes assessed in such trials may include changes (both gains and losses) of visual acuity, quality of life, and adverse events such as posterior capsular rupture and retinal detachment. Both short-term (six-month) and long-term (one- or two-year) outcomes should be examined.

PLAIN LANGUAGE SUMMARY

Surgery to remove cataracts after vitrectomy

Review aim

The aim of this Cochrane Review was to evaluate the evidence regarding the effect of surgery to remove the lens from eyes in which cataracts (clouding of the lens in front of the eye) develop after vitrectomy. Vitrectomy surgery is used to remove the vitreous (the clear gel) in the center of the eye during repair or amelioration of a number of retinal disorders (such as retinal detachment and macular holes or in cases of vitreous hemorrhage).

What was studied in this review?

Vitrectomy can result in the formation or acceleration of cataract. The underlying problem that led to vitrectomy may affect visual acuity, quality of life, and other outcomes after the surgery to remove the cataractous lens.

Main results

We found no randomized controlled trials (trials in which participants had been randomly assigned to one treatment group or another) that evaluated the benefits or risks (or both) of cataract surgery following vitrectomy. Since cataract surgery may lead to loss of vision due to worsening or recurrence of the condition that prompted the vitrectomy, its role in these patients remains unknown. Future trials to address this review question should separate participants by age, the disorder leading to vitrectomy, and the status of the underlying disease process in the opposite eye. Outcomes relevant to patients such as improvement in visual acuity, other measures of vision, and quality of life usually expected from cataract surgery, and harms should be examined both in the short term (six months after cataract surgery) and in the long term (one to two years after cataract surgery).

Key messages

There is an evidence gap as to whether surgery to remove cataracts in people in whose eyes cataracts develop after vitrectomy is better than no surgery.

How up-to-date is the review?

We searched for studies published up to 17 May 2017.

BACKGROUND

Description of the condition

Vitrectomy, commonly known as par plana vitrectomy (PPV), is a microsurgical procedure in which the vitreous gel is removed from an eye. Vitrectomy first was developed by Machemer in 1971 ([Machemer 1971](#)). Advances in surgical technique and instrumentation over the past 40 years have made vitrectomy a common surgical procedure for posterior segment disorders. Vitrectomy is indicated for numerous ocular conditions including vitreous loss in cataract surgery, subluxation of the lens, malignant glaucoma, dense pupillary membranes, non-clearing vitreous hemorrhage due to diabetic retinopathy or vein occlusions, retinal detachment, macular hole, macular pucker, vitreo-macular traction, and endophthalmitis. Specialized instruments and techniques are used to gain access to the vitreous cavity and retina. During vitrectomy surgery, three small incisions, each approximately 1.4 mm in length, are made in the eye in order to place instruments: a vitreous cutter, a fiber optic light source to illuminate the inside of the eye, and an infusion cannula to maintain proper intraocular pressure during the removal of the vitreous and other surgical maneuvers. At the end of surgery, the vitreous cavity may be filled with air, gas, silicone oil, or another type of tamponade to reduce the risk of retinal detachment or may be left unfilled.

Although vitrectomy has revolutionized the treatment of posterior segment disorders and improved visual outcomes in people with retinal diseases requiring surgical intervention, vitrectomy may compromise visual acuity by inducing cataract formation or progression in phakic eyes ([Benson 1988](#)). The three types of cataract are classified according to the location of the opacity: cortical, nuclear sclerosis, and posterior subcapsular. The type of cataract that forms or accelerates after vitrectomy is nuclear sclerotic cataract. In their 2004 review, Panozzo and Parolini noted that "Cataract formation is the most frequent complication of pars plana vitrectomy, even without the use of air, gas, or silicone oil". They reported that published proportions of eyes followed for at least 12 months in which nuclear sclerotic cataract developed after vitrectomy without vitreous tamponade ranged from 12% to 80% depending upon the length of follow-up and age of patients at time of vitrectomy. Published proportions for eyes followed for at least 12 months after vitrectomy and gas tamponade ranged from 45% to 84% ([Panozzo 2004](#)).

The exact pathogenesis of cataract formation or acceleration after vitrectomy is unknown. Older studies have suggested that light toxicity, oxidation of lens proteins, use of intraocular gas, and length of operative time may be causative factors ([Cherfan 1991](#); [de Bustros 1988](#); [Ogura 1991](#)). Newer research suggests that vitrectomy surgery increases oxygen tension within the eye; oxygen exposure has been linked with progressive nuclear sclerotic cataract formation ([Holekamp 2005](#); [Palmquist 1988](#)).

Epidemiology

As noted by Panozzo and Parolini, the studies they cited regarding cataract after vitrectomy typically were retrospective in design, varied in the method of diagnosing and classifying cataract, and reported the outcome after differing lengths of time after vitrectomy. The most reliable incidence data have been reported from multicenter randomized trials in which vitrectomy was an intervention because of their prospective design, detailed

description of methods of cataract classification, and scheduled follow-up examinations and procedures for study eyes.

The Vitrectomy for Macular Hole Study, a randomized controlled trial that evaluated vitrectomy for the treatment of macular holes, retrospectively examined the incidence of cataract progression from baseline scores among 74 phakic eyes of participants in the study who had only a single vitrectomy procedure ([Cheng 2001](#)). Investigators used a scoring system similar to the Lens Opacities Classification System II, which contains five grading categories for nuclear and posterior subcapsular opacities. Although duration of surgery did not increase the risk for cataract progression, vitrectomy itself was a risk factor for cataract acceleration; 60/74 (81%) eyes in the surgery cohort had nuclear sclerotic cataract progression at six months of follow-up, compared with only 13/74 (18%) fellow eyes in the control group. Mean scores for nuclear sclerosis had increased from 1.08 ± 0.72 at baseline to 1.51 ± 0.59 by 12 months. By two years, 100% of eyes in the surgery cohort had cataract progression, compared with 8% of control eyes.

During the late 1990s, the Submacular Surgery Trials (SST) were initiated to evaluate surgical removal of subfoveal choroidal neovascularization (CNV) compared with observation in people with age-related macular degeneration (AMD) (SST Group N and Group B studies), ocular histoplasmosis syndrome (OHS) (SST Group H study), and idiopathic CNV (SST Group H study) ([SST 2004a](#); [SST 2004b](#); [SST 2004c](#)). In these three randomized controlled trials, visually significant cataract was defined as either cataract surgery or lens opacity reported by the SST ophthalmologist to be sufficient to reduce visual acuity by two or more lines in a normal eye. Among the AMD participants in the SST Group N study, 80% of eyes assigned to vitrectomy and surgical removal of their subfoveal CNV had developed visually significant cataracts by two years of follow-up. Sixty per cent of eyes had undergone cataract surgery by their last follow-up examination two to four years after enrollment. Among the OHS participants in the SST Group H study, 39% of eyes assigned to vitrectomy developed visually significant cataracts, among which 24% underwent cataract removal. The difference between eyes with AMD and eyes with OHS developing postvitrectomy cataract was likely due to the median age of the participants. Patients under the age of 50 years have been reported rarely to develop postsurgical accelerated nuclear sclerosis ([Melberg 1995](#)).

Presentation and diagnosis

As with other cataract, eyes with postvitrectomy cataract typically present with decreased visual acuity despite anatomic and initial functional success of the vitrectomy surgery. Individuals who have undergone vitrectomy may have had lower levels of pre-vitrectomy visual acuity or other vision deficits due to the underlying retinal pathology; therefore those with postvitrectomy cataract may present with poorer vision than individuals with typical age-related cataracts. Diagnosis is based on ocular examination using slit-lamp biomicroscopy, recognition of nuclear sclerosis, and the history of vitrectomy.

Description of the intervention

Cataract surgery, typically performed using phacoemulsification and intraocular lens implantation, commonly is recommended for individuals with visually significant lens opacities. Two features of postvitrectomy nuclear sclerosis make affected lenses especially

challenging for cataract surgeons to remove. The nucleus tends to be harder than in age-related nuclear sclerosis, requiring longer phacoemulsification time during the procedure. Also, the absence of vitreous in the posterior segment allows for more mobility of the posterior capsule, increasing the risk of capsular rupture. Surgery for postvitrectomy nuclear sclerotic cataract thus may be associated with a higher incidence of complications, although evidence from comparative studies is lacking (Ahfat 2003; Biro 2002). Thus, surgery to remove the lens of eyes with postvitrectomy cataract may result in no or less visual acuity improvement and more complications than usually anticipated following surgery for typical age-related cataract.

How the intervention might work

While people who develop cataract after vitrectomy may undergo cataract extraction, visual acuity and other outcomes after cataract surgery may be poor due to the underlying retinal disorder. Most people who have vitrectomy surgery have serious underlying problems, as indicated by the reasons for vitrectomy. Furthermore, eyes with postvitrectomy cataract are at risk of the complications that can affect all eyes that undergo cataract surgery such as endophthalmitis, cystoid macular edema, etc. Vision is often already impaired before cataract surgery and may remain impaired after cataract surgery. Although cataract surgery in a normal eye typically improves vision, the visual prognosis after surgery for postvitrectomy cataract is uncertain. It likely depends on the success of treatment for the retinal disorder and avoidance of complications during cataract surgery.

Why it is important to do this review

The incidence of cataract formation after vitrectomy varies widely and has been reported to be between 6% and 100%. The majority of published studies confirm that a high rate of cataract formation occurs, but few data are available on visual acuity outcomes after cataract removal. The retinal problem that led to vitrectomy may progress or recur. However, peer-reviewed data on outcomes after surgery for postvitrectomy cataract are scarce. Even in cases in which cataract formation is not due to vitrectomy, visual impairment can still exist despite cataract extraction. The Los Angeles Latino Eye Study published visual acuity outcomes after cataract extraction in adult Latinos and reported that 41% of eyes had visual impairment (defined as a best-corrected visual acuity of 20/40 Snellen equivalent or less) (Baraňano 2007). Age-related macular degeneration and diabetic retinopathy accounted for approximately 57% of retinal pathology after cataract extraction. In addition, in eyes that have undergone vitrectomy surgery the absence of vitreous in the posterior segment allows for more mobility of the posterior capsule, increasing the risk of capsular rupture. Surgery for postvitrectomy nuclear sclerotic cataract may be associated with a higher incidence of complications. A prospective case series demonstrated postoperative complications such as posterior capsule rupture, lens subluxation, vitreous hemorrhage, and retinal redetachment (Pardo-Muñoz 2006). A systematic review of outcomes from controlled clinical trials would therefore provide information for adequate counseling of patients and for guiding ophthalmologists' recommendations.

OBJECTIVES

To evaluate the effectiveness and safety of surgery versus no surgery for postvitrectomy cataract with respect to visual acuity, quality of life, and other outcomes.

METHODS

Criteria for considering studies for this review

Types of studies

We planned to include eligible randomized and quasi-randomized controlled trials in this review as described in our review protocol (Do 2007). We considered quasi-randomized trials to be trials that had adopted a method of allocation intended to allocate participants in a random fashion but were not strictly random. Examples include allocation by date of birth, Social Security number, etc. We planned to include trials with at least six months' follow-up to allow for reporting of early adverse effects, even though our primary analysis would focus on one-year follow-up.

Types of participants

We planned to include trials that enrolled adult participants (age 18 years and over) with cataract that had developed after vitrectomy for any indication except for trauma. However, we planned to exclude trials that included both adult patients who had post-traumatic vitrectomy and patients who had other indications for vitrectomy, except when outcomes were reported separately by indication. We planned to exclude trials that included only trauma cases, because these patients typically are younger and the pathogenesis of cataract formation is different.

Types of interventions

We planned to include trials that compared cataract surgery (of any type) with no surgery in such patients.

Types of outcome measures

Primary outcomes

Visual acuity improvement after cataract surgery of at least three letters on a logMAR chart, one line on the Snellen chart, or equivalent changes on other scales. While we planned to analyze the outcomes at one year, two years, and at longer time points of follow-up as available from the included studies, our primary analysis was to focus on one-year follow-up.

Secondary outcomes

1. Quality of life measured by a validated scale.
2. Contrast sensitivity: improvement of at least one level, regardless of the manner in which it was measured in the included trials.
3. Progression of the condition that was the original indication for vitrectomy in people with diabetic retinopathy and age-related macular degeneration (AMD) as defined by standard grading scales such as the Diabetic Retinopathy Scale for DR (ETDRS 1991) and the International Scale for AMD (Bird 1995).

Adverse outcomes

Specific adverse effects of interest included:

- cystoid macular edema;

- intraocular lens-related complications, including dislocation, difficulty in placing the lens;
- capsular opacification;
- retinal detachment (new or recurrent).

We also planned to summarize all other adverse effects reported in the included studies.

Economic outcomes

We planned to tabulate or summarize data on the costs of procedures, consequences of complications, and any cost-effectiveness data reported in the included studies in a narrative fashion.

Search methods for identification of studies

Electronic searches

The Cochrane Eyes and Vision Information Specialist conducted systematic searches in the following databases for randomized controlled trials and controlled clinical trials. There were no language or publication year restrictions. The date of the search was 17 May 2017.

- Cochrane Central Register of Controlled Trials (CENTRAL; 2017, Issue 5) (which contains the Cochrane Eyes and Vision Trials Register) in the Cochrane Library (searched 17 May 2017) ([Appendix 1](#))
- MEDLINE Ovid (1946 to 17 May 2017) ([Appendix 2](#))
- Embase.com (1947 to 17 May 2017) ([Appendix 3](#))
- PubMed (1946 to 17 May 2017) ([Appendix 4](#))
- LILACS (Latin American and Caribbean Health Science Information database) (1982 to 17 May 2017) ([Appendix 5](#))
- metaRegister of Controlled Trials (mRCT) (www.controlled-trials.com; last searched May 2013) ([Appendix 6](#))
- US National Institutes of Health Ongoing Trials Register ClinicalTrials.gov (www.clinicaltrials.gov; searched 17 May 2017) ([Appendix 7](#))
- World Health Organization (WHO) International Clinical Trials Registry Platform (ICTRP) (www.who.int/ictip; searched 17 May 2017) ([Appendix 8](#))

We revised the searches of electronic databases in 2013 from the 2011 update. We searched PubMed and the WHO ICTRP, which we had not originally searched. We are no longer searching the UK Clinical Research Network Portfolio Database and the Australian New Zealand Clinical Trials Registry for this review.

Searching other resources

We planned to search the reference lists of included studies and the Science Citation Index-Expanded database to identify any additional trials. We did not search any conference proceedings specifically for the purpose of this review.

Data collection and analysis

Selection of studies

Two review authors independently screened the titles and abstracts of all records identified in the electronic and manual searches. We labeled each record as 'yes - relevant', 'maybe - possibly relevant', or 'no - definitely not relevant'. Two review

authors then screened the full reports of records labeled 'yes' or 'maybe'; we re-labeled each record as 'A - include' or 'C - exclude' based on consensus after review of the full reports. We listed studies reported in records labeled 'C - exclude' after full-text review in the 'Characteristics of excluded studies' table with reasons for exclusion. We planned to assess methodological quality for studies labeled as 'A - include', however neither of the two review authors labeled a study as 'A - include'.

We found no trials eligible for inclusion in either the original review or the updated review. The methods described below will be applicable to future updates of the review when trials eligible for inclusion have been conducted and reported.

Data extraction and management

Two review authors will independently extract data on basic characteristics of each study (including details of study design, characteristics of participants, interventions, and comparators) and the primary and secondary outcomes onto data collection forms developed in collaboration with Cochrane Eyes and Vision. Any discrepancies will be resolved by discussion. We will contact the authors of included studies for missing data. One review author will enter all data into Review Manager 5 ([Review Manager 2014](#)), and another review author will verify the data.

Assessment of risk of bias in included studies

Two review authors will independently assess the included studies for sources of systematic bias according to the guidelines in Chapter 8 of the *Cochrane Handbook for Systematic Reviews of Interventions* ([Higgins 2011a](#)). We will evaluate studies for the following criteria: method of randomization and allocation concealment (selection bias), masking of outcome assessment (detection bias), completeness of outcome data and intention-to-treat analysis (attrition bias), and other potential sources of bias including source of trial funding. We will not assess masking of investigators, as the interventions to be compared preclude such efforts. Though an artificial lens placed in the eyes of participants in the intervention group may be recognized by the anatomic outcome assessor, visual acuity testing may have been performed by someone not responsible for examining the eye. Also, quality of life data may have been collected by some method that preserves masking of intervention or outcome assessment, or both. We will judge each criterion as either 'low risk of bias', 'high risk of bias', or 'unclear risk of bias'. The information in the *Cochrane Handbook for Systematic Reviews of Interventions* will guide our judgement for each criterion. We will contact authors of studies labeled 'unclear' for clarification. Differences between the two review authors will be resolved by discussion.

Measures of treatment effect

We will calculate a summary risk ratio for dichotomous outcomes (visual acuity improvement, progression of the condition that was the original indication for vitrectomy, and adverse events). We will calculate the mean difference for continuous outcomes (quality of life, cost-effectiveness, and contrast sensitivity).

Unit of analysis issues

The unit of analysis will be the eye for vision-related outcomes (visual acuity, contrast sensitivity, progression, and adverse events). The unit of analysis will be the person for quality of life and economic outcomes.

Dealing with missing data

We will attempt to contact the investigators of included trials for any missing data. If the investigators do not respond within four weeks, we will extract available data from the published report. We will refer to the guidelines in Chapter 16 of the *Cochrane Handbook for Systematic Reviews of Interventions* for handling missing data (Higgins 2011b).

Assessment of heterogeneity

We will examine the design and clinical heterogeneity among included studies by carefully analyzing their characteristics to determine whether the participants included, interventions compared, and outcomes assessed among individual trials are comparable. We will test for statistical heterogeneity formally using the χ^2 test. We also will use the I^2 statistic value to determine the proportion of variation due to heterogeneity among studies, and will consider an I^2 value greater than 50% to indicate substantial statistical heterogeneity. We will examine the degree of overlap in the confidence intervals of the studies. If there is poor overlap, we will take this to indicate the presence of statistical heterogeneity.

Assessment of reporting biases

We will examine a funnel plot to identify any evidence of publication bias when a sufficient number of studies are included, that is 10 or more. We will assess for selective outcome reporting at the individual trial level as part of the [Assessment of risk of bias in included studies](#).

Data synthesis

In the presence of methodological or clinical heterogeneity, we will not perform meta-analysis, and will describe the individual trial findings in the results section of the review.

If we detect no substantial methodological or clinical heterogeneity, we will combine trial results in meta-analysis. If there is a small number of trials in the analysis (fewer than three), we will use a fixed-effect model. If the number of trials is three or greater, we will use a random-effects model. If substantial statistical heterogeneity is detected (I^2 value greater than 50%), we will not present a summary effect measure and will report the individual trial findings narratively.

Subgroup analysis and investigation of heterogeneity

We will investigate heterogeneity, if present, through subgroup analyses. If sufficient data are available, we will conduct subgroup analyses based on the agents used to fill the vitreous space after vitrectomy, for example air, different gases, and by different indications for vitrectomy.

Sensitivity analysis

We will conduct sensitivity analyses to determine the impact of exclusion of studies of lower methodological quality, including

quasi-randomized trials, and exclusion of industry-funded studies and unpublished studies.

Summary of findings

When sufficient data are available, we will present a 'Summary of findings' table of the main outcomes assessed in this review. The main outcomes, assessed at one-year postrandomization, include visual acuity improvement after cataract surgery, quality of life measures, contrast sensitivity, progression of the condition that led to vitrectomy, economic outcomes, and adverse effects.

We will assess the certainty of evidence for each outcome using the GRADE approach (GRADEpro 2014). Two review authors will independently judge each outcome as providing very low, low, moderate, or high certainty of evidence. Any discrepancies will be resolved by discussion. We will base our judgements on the following five criteria.

1. Risk of bias in individual trials
2. Indirectness
3. Heterogeneity
4. Imprecision of estimate (wide confidence intervals)
5. Publication bias

RESULTS

Description of studies

Results of the search

The original electronic searches retrieved a total of 1949 references and 29 additional records from clinical trials registers. After two review authors independently reviewed the titles and abstracts, we retrieved 36 full-text articles. We found no randomized or quasi-randomized trials eligible for inclusion in the review.

An updated search in April 2011 identified 785 references and 18 additional records from clinical trials registers. None of the records were eligible for inclusion in the review.

Another updated search in May 2013 identified 1009 references and 120 additional records from clinical trials registers. None of the records were eligible for inclusion in the review. During the process of this update, we reassessed the eligibility for all previously excluded studies and removed 22 out of 36 references from the list by reviewing titles and abstracts. All of the 22 references were either non-human study or non-randomized controlled trials. We kept the reasons for exclusion for the remaining 14 references from 10 studies in the [Characteristics of excluded studies](#) table.

The most recent updated search conducted in May 2017 yielded 891 references and 30 additional records from clinical trials registers. We assessed the records but none were randomized or quasi-randomized clinical trials (Figure 1).

Figure 1. Study flow diagram.

Included studies

We did not identify any studies eligible for inclusion in this review.

Excluded studies

We excluded 10 studies after review of the full-text report; none were relevant to the objective of this systematic review.

Risk of bias in included studies

We found no trials eligible for inclusion in the review to assess for risk of bias.

Effects of interventions

We found no trials eligible for inclusion in the review and therefore no information on effects of interventions.

DISCUSSION

We found no RCT or quasi-RCT that addressed the research question targeted for this review. The majority of the published literature on this subject is limited to retrospective case reports or non-randomized prospective case series ([Ahfat 2003](#); [Pardo-Muñoz 2006](#)). The dearth of information on surgery for postvitrectomy cataract indicates that appropriate research on this topic is needed, as thousands of people undergo vitrectomy each year and are at risk of development of cataract and cataract surgery. Documentation of both the risks and benefits of surgery for postvitrectomy cataract from randomized trials is needed to inform patient counseling and clinical recommendations.

AUTHORS' CONCLUSIONS

Implications for practice

In the absence of data from controlled trials, ophthalmologists have no reliable evidence on which to base their advice to patients regarding the risks and benefits of surgery for postvitrectomy cataract, and no basis for recommendations for or against cataract surgery or when to intervene surgically. Although eyes that have not had vitrectomy are at risk of some complications following cataract surgery, primarily cystoid macular edema, the risks for eyes with postvitrectomy are greater. It is possible that some of the complications of surgery for postvitrectomy cataract could be reduced if surgery were known to be beneficial, at least in some subgroups of patients, and to be beneficial if performed at an early stage of development of nuclear sclerosis. Data from retrospective studies are inadequate for these purposes.

Implications for research

There is a clear need for well-designed randomized controlled trials to evaluate the benefits and risks of surgery for cataracts that develop following vitrectomy. We recommend that randomization in such trials be stratified by patients' age, retinal disorder leading to vitrectomy, and status of the pathologic process in the contralateral eye. Because people who undergo vitrectomy already have reduced vision due to the underlying condition that prompted vitrectomy, relevant outcomes such as quality of life and other outcomes that are important to patients should be

considered in addition to visual acuity and other clinical measures of vision. Analyses should address both short-term (six-month) and long-term (one-year to two-year) outcomes. Data on adverse outcomes, including complications of surgery such as posterior capsular rupture, should be documented in future trials.

Because surgery for age-related cataract is so common, there are perceived ethical difficulties in conducting a randomized trial of surgery for postvitrectomy cataract. Randomization to immediate surgery versus observation for an extended period may not be a design acceptable to ophthalmologists or patients. Other designs may be more acceptable, for example, randomization to immediate cataract surgery versus delayed cataract surgery, for a defined period of time or based on rate of cataract progression or other criteria. The pool of patients available for a randomized trial of any design may be hampered by the current trend of combined vitrectomy and lens removal in elderly patients. However, with careful planning, it should be possible to overcome the logistical and ethical challenges of designing and conducting appropriate randomized trials.

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REFERENCES

References to studies excluded from this review

Ahmadiéh 2005 {published data only}

Ahmadiéh H, Moradian S, Faghihi H, Parvaresh MM, Ghanbari H, Mehryar M, et al. Anatomic and visual outcomes of scleral buckling versus primary vitrectomy in pseudophakic and aphakic retinal detachment: six-month follow-up results of a single operation — report no. 1. *Ophthalmology* 2005;**112**(8):1421-9.

Asaria 2001 {published data only}

Asaria RH, Kon CH, Bunce C, Charteris DG, Wong D, Khaw PT, et al. Adjuvant 5-fluorouracil and heparin prevents proliferative vitreoretinopathy: results from a randomized, double-blind, controlled clinical trial. *Ophthalmology* 2001;**108**(7):1179-83.

Batman 1999 {published data only}

Batman C, Cekic O. Vitrectomy with silicone oil or long-acting gas in eyes with giant retinal tears: long-term follow-up of a randomized clinical trial. *Retina* 1999;**19**(3):188-92.

Blankenship 1980 {published data only}

Blankenship GW. The lens influence on diabetic vitrectomy results. Report of a prospective randomized study. *Archives of Ophthalmology* 1980;**98**(12):2196-8.

DRVS 1985 {published data only}

The Diabetic Retinopathy Vitrectomy Study Research Group. Early vitrectomy for severe proliferative diabetic retinopathy in eyes with useful vision. Results of a randomized trial — Diabetic Retinopathy Vitrectomy Study Report 3. The Diabetic Retinopathy Vitrectomy Study Research Group. *Ophthalmology* 1988;**95**(10):1307-20.

The Diabetic Retinopathy Vitrectomy Study Research Group. Early vitrectomy for severe vitreous hemorrhage in diabetic retinopathy. Four-year results of a randomized trial: Diabetic Retinopathy Vitrectomy Study Report 5. *Archives of Ophthalmology* 1990;**108**(7):958-64.

The Diabetic Retinopathy Vitrectomy Study Research Group. Early vitrectomy for severe vitreous hemorrhage in diabetic retinopathy. Two-year results of a randomized trial. Diabetic Retinopathy Vitrectomy Study Report 2. The Diabetic Retinopathy Vitrectomy Study Research Group. *Archives of Ophthalmology* 1985;**103**(11):1644-52.

Ehud 1988 {published data only}

Ehud A, Varda C, Joseph M, Giora T. Management of complicated retinal detachment by vitrectomy and silicone oil injection. *Metabolic, Pediatric, and Systemic Ophthalmology* 1988;**11**(1-2):63-6.

Ezra 2004 {published data only}

Ezra E, Gregor ZJ. Surgery for idiopathic full-thickness macular hole: two-year results of a randomized clinical trial comparing natural history, vitrectomy, and vitrectomy plus autologous serum: Morfields Macular Hole Study Group Report no. 1. *Archives of Ophthalmology* 2004;**122**(2):224-36.

Freeman 1997 {published data only}

Freeman WR, Azen SP, Kim JW, el-Haig W, Mishell DR 3rd, Bailey I. Vitrectomy for the treatment of full-thickness stage 3 or 4 macular holes. Results of a multicentered randomized clinical trial. The Vitrectomy for Treatment of Macular Hole Study Group. *Archives of Ophthalmology* 1997;**115**(1):11-21.

Haimann 1984 {published data only}

Haimann MH, Abrams GW. Prevention of lens opacification during diabetic vitrectomy. *Ophthalmology* 1984;**91**(2):116-21.

Silicone Study 1992 {published data only}

Vitrectomy with silicone oil or perfluoropropane gas in eyes with severe proliferative vitreoretinopathy: results of a randomized clinical trial. Silicone Study Report 2. *Archives of Ophthalmology* 1992;**110**(6):780-92.

Vitrectomy with silicone oil or sulfur hexafluoride gas in eyes with severe proliferative vitreoretinopathy: results of a randomized clinical trial. Silicone Study Report 1. *Archives of Ophthalmology* 1992;**110**(6):770-9.

Abrams GW, Azen SP, McCuen BW 2nd, Flynn HW Jr, Lai MY, Ryan SJ. Vitrectomy with silicone oil or long-acting gas in eyes with severe proliferative vitreoretinopathy: results of additional and long-term follow-up. Silicone Study Report 11. *Archives of Ophthalmology* 1997;**115**(3):335-44.

Additional references

Ahfat 2003

Ahfat FG, Yuen CH, Groenewald CP. Phacoemulsification and intraocular lens implantation following pars plana vitrectomy: a prospective study. *Eye* 2003;**17**(1):16-20.

Barañano 2007

Barañano AE, Wu J, Mazhar K, Azen SP, Varma R, Los Angeles Latino Eye Study Group. Visual acuity outcomes after cataract extraction in adult Latinos. The Los Angeles Latino Eye Study. *Ophthalmology* 2008;**115**(5):815-21.

Benson 1988

Benson WE. Vitrectomy in clinical ophthalmology. In: Duane TD editor(s). *Duane's Clinical Ophthalmology*. Vol. 5, Philadelphia: Lippincott, 1988:15-7.

Bird 1995

Bird AC, Bressler NM, Bressler SB, Chisholm IH, Coscas G, Davis MD, et al. An international classification and grading system for age-related maculopathy and age-related macular degeneration. The International ARM Epidemiological Study Group. *Survey of Ophthalmology* 1995;**39**(5):367-74.

Biro 2002

Biro Z, Kovacs B. Results of cataract surgery in previously vitrectomized eyes. *Journal of Cataract and Refractive Surgery* 2002;**28**(6):1003-6.

Cheng 2001

Cheng L, Azen SP, El-Bradey MH, Scholz BM, Chaidhawangul S, Toyoguchi M, et al. Duration of vitrectomy and postoperative cataract in the Vitrectomy for Macular Hole Study. *American Journal of Ophthalmology* 2001;**132**(6):881-7.

Cherfan 1991

Cherfan GM, Michels RG, de Bustros S, Enger C, Glaser BM. Nuclear sclerotic cataract after vitrectomy for idiopathic epiretinal membranes causing macular pucker. *American Journal of Ophthalmology* 1991;**111**(4):434-8.

de Bustros 1988

de Bustros S, Thompson JT, Michels RG, Enger C, Rice TA, Glaser BM. Nuclear sclerosis after vitrectomy for idiopathic epiretinal membrane. *American Journal of Ophthalmology* 1988;**105**(2):160-4.

ETDRS 1991

Fundus photographic risk factors for progression of diabetic retinopathy. ETDRS report number 12. Early Treatment Diabetic Retinopathy Study Research Group. *Ophthalmology* 1991;**98**(Suppl 5):823-33.

GRADEpro 2014 [Computer program]

GRADE Working Group, McMaster University. GRADEpro GDT. Version (accessed prior to 10 October 2017). Hamilton (ON): GRADE Working Group, McMaster University, 2014.

Higgins 2011a

Higgins JP, Altman DG, Sterne JAC, editor(s). Chapter 8: Assessing risk of bias in included studies. In: Higgins JP, Green S, editor(s). *Cochrane Handbook for Systematic Reviews of Interventions* Version 5.1.0 (updated March 2011). The Cochrane Collaboration, 2011. Available from handbook.cochrane.org.

Higgins 2011b

Higgins JP, Deeks JJ, Altman DG, editor(s). Chapter 16: Special topics in statistics. In: Higgins JP, Green S, editor(s). *Cochrane Handbook for Systematic Reviews of Interventions* Version 5.1.0 (updated March 2011). The Cochrane Collaboration, 2011. Available from handbook.cochrane.org.

Holekamp 2005

Holekamp NM, Shui YB, Beebe DC. Vitrectomy surgery increases oxygen exposure to the lens: a possible mechanism for nuclear cataract formation. *American Journal of Ophthalmology* 2005;**139**(2):302-10.

Machemer 1971

Machemer R, Buettner H, Norton EWD, Parel JM. Vitrectomy: a pars plana approach. *Transactions of the American Academy of Ophthalmology and Otolaryngology* 1971;**75**(4):813-20.

Melberg 1995

Melberg NS, Thomas MA. Nuclear sclerotic cataract after vitrectomy in patients under 50 years of age. *Ophthalmology* 1995;**102**(10):1466-71.

Ogura 1991

Ogura Y, Takanashi T, Ishigooka H, Ogino N. Quantitative analysis of lens changes after vitrectomy by fluorophotometry. *American Journal of Ophthalmology* 1991;**111**(2):179-83.

Palmquist 1988

Palmquist BM, Philipson B, Fagerholm P. Nuclear cataract — a microradiographic study. *Acta Ophthalmologica* 1988;**66**(6):671-7.

Panozzo 2004

Panozzo G, Parolini B. Cataracts associated with posterior segment surgery. *Ophthalmology Clinics of North America* 2004;**17**(4):557-68.

Pardo-Muñoz 2006

Pardo-Muñoz A, Muriel-Herrero A, Abaira V, Muriel A, Muñoz-Negrete FJ, Murube J. Phacoemulsification in previously vitrectomized patients: an analysis of the surgical results in 100 eyes as well as the factors contributing to the cataract formation. *European Journal of Ophthalmology* 2006;**16**(1):52-9.

Review Manager 2014 [Computer program]

Nordic Cochrane Centre, The Cochrane Collaboration. Review Manager 5 (RevMan 5). Version 5.3. Copenhagen: Nordic Cochrane Centre, The Cochrane Collaboration, 2014.

SST 2004a

Submacular Surgery Trials Research Group. Surgery for subfoveal choroidal neovascularization in age-related macular degeneration: ophthalmic findings: SST report no. 11. *Ophthalmology* 2004;**111**(11):1967-80.

SST 2004b

Submacular Surgery Trials Research Group. Surgery for hemorrhagic choroidal neovascular lesions of age-related macular degeneration: ophthalmic findings. SST report no. 13. *Ophthalmology* 2004;**111**(11):1993-2006.

SST 2004c

Submacular Surgery Trials Research Group. Surgical removal vs observation for subfoveal choroidal neovascularization, either associated with the ocular histoplasmosis syndrome or idiopathic: I. Ophthalmic findings from a randomized clinical trial: Submacular Surgery Trials (SST) Group H Trial: SST Report No. 9. *Archives of Ophthalmology* 2004;**122**(11):1597-611.

References to other published versions of this review

Do 2007

Do DV, Hawkins BS, Gichuhi S. Surgery for post-vitrectomy cataract. *Cochrane Database of Systematic Reviews* 1, Issue 2007. [DOI: [10.1002/14651858.CD006366](https://doi.org/10.1002/14651858.CD006366)]

Do 2008

Do DV, Hawkins B, Gichuhi S, Vedula SS. Surgery for post-vitrectomy cataract. *Cochrane Database of Systematic Reviews* 2008, Issue 3. [DOI: [10.1002/14651858.CD006366.pub2](https://doi.org/10.1002/14651858.CD006366.pub2)]

Do 2013

Do DV, Gichuhi S, Vedula SS, Hawkins BS. Surgery for post-vitrectomy cataract. *Cochrane Database of Systematic Reviews* 2013, Issue 12. [DOI: [10.1002/14651858.CD006366.pub3](https://doi.org/10.1002/14651858.CD006366.pub3)]

CHARACTERISTICS OF STUDIES

Characteristics of excluded studies [ordered by study ID]

Study	Reason for exclusion
Ahmadiieh 2005	RCT, not postvitrectomy patients
Asaria 2001	RCT, postvitrectomy patients, not for cataract surgery
Batman 1999	RCT, not postvitrectomy patients, not for cataract surgery
Blankenship 1980	RCT, not postvitrectomy patients, not for cataract surgery
DRVS 1985	RCT or CCT, not postvitrectomy patients, not for cataract surgery
Ehud 1988	RCT, not postvitrectomy patients, not for cataract surgery
Ezra 2004	RCT, not postvitrectomy patients, not for cataract surgery
Freeman 1997	RCT, not postvitrectomy patients, not for cataract surgery
Haimann 1984	RCT, not postvitrectomy patients, not for cataract surgery
Silicone Study 1992	RCT, postvitrectomy patients, not for cataract surgery

CCT: controlled clinical trial

RCT: randomized controlled trial

APPENDICES

Appendix 1. CENTRAL search strategy

```
#1 MeSH descriptor: [Vitrectomy] explode all trees
#2 MeSH descriptor: [Vitreoretinal Surgery] explode all trees
#3 (vitrectom* or post-vitrectom* or postvitrectom*)
#4 (vitreous surg* or vitreous resection* or vitreoretinal surg*)
#5 #1 or #3 or #4
#6 MeSH descriptor: [Cataract] explode all trees
#7 MeSH descriptor: [Cataract Extraction] explode all trees
#8 MeSH descriptor: [Capsulorhexis] explode all trees
#9 MeSH descriptor: [Phacoemulsification] explode all trees
#10 cataract*
#11 lens*
#12 (phakectom* or zonulolys* or catarectom*)
#13 (pha*oemulsif* or pha?o or Capsulor*hexis or lensectom*)
#14 #6 or #7 or #8 or #9 or #10 or #11 or #12 or #13
#15 #5 and #14
```

Appendix 2. MEDLINE Ovid search strategy

1. Randomized Controlled Trial.pt.

2. Controlled Clinical Trial.pt.
3. (randomized or randomised).ab,ti.
4. placebo.ab,ti.
5. drug therapy.fs.
6. randomly.ab,ti.
7. trial.ab,ti.
8. groups.ab,ti.
9. 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8
10. exp animals/ not humans.sh.
11. 9 not 10
12. exp Vitrectomy/
13. exp Vitreoretinal Surgery/
14. (vitrectom* or post-vitrectom* or postvitrectom*).tw.
15. (vitreous surg* or vitreous resection* or vitreoretinal surg*).tw.
16. 12 or 14
17. exp Cataract/
18. exp Cataract Extraction/
19. exp Capsulorhexis/
20. exp Phacoemulsification/
21. cataract*.tw.
22. lens*.tw.
23. (Phakectom* or Zonulolys* or catarectom*).tw.
24. (pha*oemulsif* or pha?o or Capsulor*hexis or lensectom*).tw.
25. or/17-24
26. 16 and 25
27. 11 and 26

Appendix 3. Embase.com search strategy

- #1 'randomized controlled trial'/exp
- #2 'randomization'/exp
- #3 'double blind procedure'/exp
- #4 'single blind procedure'/exp
- #5 random*:ab,ti
- #6 #1 OR #2 OR #3 OR #4 OR #5
- #7 'animal'/exp OR 'animal experiment'/exp
- #8 'human'/exp
- #9 #7 AND #8
- #10 #7 NOT #9
- #11 #6 NOT #10
- #12 'clinical trial'/exp
- #13 (clin* NEAR/3 trial*):ab,ti
- #14 ((singl* OR doubl* OR trebl* OR tripl*) NEAR/3 (blind* OR mask*)):ab,ti
- #15 'placebo'/exp
- #16 placebo*:ab,ti
- #17 random*:ab,ti
- #18 'experimental design'/exp
- #19 'crossover procedure'/exp
- #20 'control group'/exp
- #21 'latin square design'/exp
- #22 #12 OR #13 OR #14 OR #15 OR #16 OR #17 OR #18 OR #19 OR #20 OR #21
- #23 #22 NOT #10
- #24 #23 NOT #11
- #25 'comparative study'/exp
- #26 'evaluation'/exp
- #27 'prospective study'/exp
- #28 control*:ab,ti OR prospectiv*:ab,ti OR volunteer*:ab,ti
- #29 #25 OR #26 OR #27 OR #28
- #30 #29 NOT #10
- #31 #30 NOT (#11 OR #23)
- #32 #11 OR #24 OR #31
- #33 'vitrectomy'/exp

#34 'vitrectomy'/de
#35 vitrectom*:ab,ti OR postvitrectom*:ab,ti
#36 (vitreous NEAR/1 surg*):ab,ti OR (vitreous NEAR/1 resection*):ab,ti OR (vitrectomy NEAR/1 surg*):ab,ti
#37 #33 OR #34 OR #35 OR #36
#38 'cataract'/exp
#39 'cataract extraction'/exp
#40 'capsulorhexis'/exp
#41 'phacoemulsification'/exp
#42 cataract*:ab,ti
#43 lens*:ab,ti
#44 phakectomy*:ab,ti OR zonulolysis*:ab,ti OR cataractom*:ab,ti
#45 phacoemulsif*:ab,ti OR phaco:ab,ti OR phako:ab,ti OR capsulorhexis*:ab,ti OR lensectomy*:ab,ti
#46 #38 OR #39 OR #40 OR #41 OR #42 OR #43 OR #44 OR #45
#47 #32 AND #37 AND #46

Appendix 4. PubMed search strategy

#1 ((randomized controlled trial[pt]) OR (controlled clinical trial[pt]) OR (randomised[tiab] OR randomized[tiab]) OR (placebo[tiab]) OR (drug therapy[sh]) OR (randomly[tiab]) OR (trial[tiab]) OR (groups[tiab])) NOT (animals[mh] NOT humans[mh])
#2 (vitrectom*[tiab] OR post-vitrectom*[tiab] OR postvitrectom*[tiab]) NOT Medline[sb]
#3 ("vitreous surgery"[tiab] OR "vitreous surgeries"[tiab] OR vitreous resection*[tiab] OR "vitrectomy surgery"[tiab] OR "vitrectomy surgery"[tiab]) NOT Medline[sb]
#4 (#2 OR #3)
#5 (cataract*[tiab]) NOT Medline[sb]
#6 (lens*[tiab]) NOT Medline[sb]
#7 (Phakectomy*[tiab] OR Zonulolysis*[tiab] OR cataractom*[tiab]) NOT Medline[sb]
#8 (phaco*[tiab] OR phako*[tiab] OR Capsulorhexis[tiab] OR Capsulorhexis[tiab] OR lensectomy*[tiab]) NOT Medline[sb]
#9 (#5 OR #6 OR #7 OR #8)
#10 (#1 AND #4 AND #9)

Appendix 5. LILACS search strategy

(Vitrectom\$ OR post-vitrectom\$ OR postvitrectom\$ OR "vitreous surgery" OR "vitreous surgeries" OR "vitreous resection" OR "vitrectomy surgery" OR "vitrectomy surgeries" OR MH:E04.540.960\$) AND (cataract\$ OR catarata\$ OR lens\$ OR capsulor\$ OR phaco\$ OR phako\$ OR phacoemulsif\$ OR phakectomy\$ OR Zonulolysis\$ OR cataractom\$ OR MH:C11.510.245\$ OR MH:E04.540.825.249\$ OR MH:E04.943.875\$)

Appendix 6. metaRegister of Controlled Trials search strategy

cataract and vitrectomy

Appendix 7. ClinicalTrials.gov search strategy

(vitrectomy OR "vitrectomy surgery" OR postvitrectomy OR "vitreous surgery" OR "vitreous resection") AND (cataract OR phacoemulsification OR capsulorhexis OR phaco OR phako)

Appendix 8. WHO ICTRP search strategy

vitrectomy AND cataract OR vitrectomy AND phacoemulsification OR vitrectomy AND capsulorhexis OR vitrectomy AND phaco OR vitrectomy AND phako

"vitrectomy surgery" AND cataract OR "vitrectomy surgery" AND phacoemulsification OR "vitrectomy surgery" AND capsulorhexis OR "vitrectomy surgery" AND phaco OR "vitrectomy surgery" AND phako

postvitrectomy AND cataract OR postvitrectomy AND phacoemulsification OR postvitrectomy AND capsulorhexis OR postvitrectomy AND phaco OR postvitrectomy AND phako

"vitreous surgery" AND cataract OR "vitreous surgery" AND phacoemulsification OR "vitreous surgery" AND capsulorhexis OR "vitreous surgery" AND phaco OR "vitreous surgery" AND phako

"vitreous resection" AND cataract OR "vitreous resection" AND phacoemulsification OR "vitreous resection" AND capsulorhexis OR "vitreous resection" AND phaco OR "vitreous resection" AND phako

WHAT'S NEW

Date	Event	Description
3 January 2018	New citation required but conclusions have not changed	Issue 1, 2018: We have updated some sections of the review, including the Implications for practice section.
3 January 2018	New search has been performed	Issue 1, 2018: Updated searches yielded no new trials.

HISTORY

Protocol first published: Issue 1, 2007

Review first published: Issue 3, 2008

Date	Event	Description
2 December 2013	New search has been performed	Issue 12, 2013: Updated searches yielded no new trials.
2 December 2013	New citation required but conclusions have not changed	Issue 12, 2013: We have updated some sections of the review, including the Implications for practice section.
5 May 2011	New search has been performed	Issue 6, 2011: Updated searches yielded no new trials.
26 March 2008	Amended	Converted to new review format.
27 September 2006	New citation required and conclusions have changed	Substantive amendment.

CONTRIBUTIONS OF AUTHORS

- Conceiving the review: BSH
- Designing the review: DVD, BSH
- Co-ordinating the review: BSH
- Data collection for the review
  - Designing electronic search strategies: Cochrane Eyes and Vision Group (CEVG) Information Specialist, DVD, BSH, SG, SV
  - Undertaking searches: CEVG Information Specialist, DVD, BSH, SG, SV
  - Screening search results: DVD, BSH, SG, SV
  - Organizing retrieval of papers: DVD
  - Screening retrieved papers against inclusion criteria: DVD, BSH, SV
  - Appraising quality of papers: DVD, BSH
  - Extracting data from papers: DVD, BSH, SV
  - Writing to authors of papers for additional information: DVD, BSH
  - Providing additional data about papers: BSH, SG
  - Data management for the review: SG, SV
  - Entering data into Review Manager 5: SG, DVD, SV
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  - Providing a clinical perspective: DVD, BSH, SG, SV
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- Writing the review: DVD, BSH, SG, SV
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- Performing previous work that was the foundation of the current study: BSH, DVD

- Updating the review: BSH, DVD
- Guarantor of the review: DVD

DECLARATIONS OF INTEREST

Diana V Do: None known.

Stephen Gichuhi: None known.

Satyanarayana S Vedula: None known.

Barbara S Hawkins: None known.

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DIFFERENCES BETWEEN PROTOCOL AND REVIEW

We updated the Methods of the review to include a 'Summary of findings' table and GRADE assessments in accordance with revised Cochrane standards.

INDEX TERMS

Medical Subject Headings (MeSH)

*Cataract Extraction; Cataract [*etiology]; Postoperative Complications [*surgery]; Quality of Life; Visual Acuity; Vitrectomy [*adverse effects]

MeSH check words

Adult; Humans