Scleral buckle or pneumatic retinopexy for rhegmatogenous retinal detachments?

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Abstract

Introduction

Rhegmatogenous retinal detachment is caused by a tear in the retina and is a frequent cause of vision loss. Its treatment is mainly surgical and the following alternatives can be identified: scleral buckling or classic surgery, pneumatic retinopexy and vitrectomy. Between the first two options, most professionals prefer scleral buckling over pneumatic retinopexy, but the latter is a simpler, cheaper and lower-risk procedure, so it is still considered as an option for selected patients. However, there is little evidence comparing both interventions.

Methods

To answer this question we used Epistemonikos, the largest database of systematic reviews in health, which is maintained by screening multiple information sources, including MEDLINE, EMBASE, Cochrane, among others. We extracted data from the systematic reviews, reanalyzed data of primary studies, conducted a meta-analysis and generated a summary of findings table using the GRADE approach.

Results and conclusions

We identified three systematic reviews including six studies overall, of which three were randomized trials. We concluded the anatomic result might be better with scleral buckling in terms of retinal reattachment and risk of recurrence, but the risk of ocular adverse events might be lower with pneumatic retinopexy.

Problem

Rhegmatogenous retinal detachment is the most common cause of retinal detachment and is caused by a full-thickness break in the retina, leading to a separation between the neurosensory retina and the retinal pigment epithelium. If left untreated, rhegmatogenous retinal detachments can progress and cause severe visual loss. The treatment is surgical and the main goal is to improve visual outcome, that depends mainly on the macular attachment or detachment and the time of evolution. Three surgical interventions are used for retinal detachment: pneumatic retinopexy, scleral buckling and vitrectomy.

Pneumatic retinopexy is performed by injecting a bubble of gas into the vitreous cavity, which pushes against the retina, allowing to use photocoagulation or cryotherapy for the retinopexy. Scleral buckling consists in using an encircling element, usually made of silicone, to achieve apposition of the neurosensory retina and the retinal pigment epithelium, with the subsequent repair of the break with photocoagulation or cryotherapy.

Our objective is to determine, using existing evidence, if scleral buckling is truly superior to pneumatic retinopexy.

Key messages

- Scleral buckling might be better than pneumatic retinopexy in achieving reattachment of the retina, and might have a lower risk of recurrence, but the certainty of the evidence is low.
- Pneumatic retinopexy might have less adverse ocular events, but the certainty of the evidence is low.
- It is not clear whether pneumatic retinopexy improves visual success because the certainty of the evidence is very low.

About the body of evidence for this question

What is the evidence. See evidence matrix in Epistemonikos later	We found three systematic reviews[1-3], including six primary studies reported in nine references[4-12], of which three corresponded to randomized trials reported in five references[4-8] because one of these studies was reported in several publications[4-6]. This table and the summary in general are based on the randomized trials since the observational studies did not increase the certainty of the existing evidence or provide additional relevant information.
What types of patients were included*	All trials included participants with phakic and non phakic eyes (aphakic and pseudophakic), with or without macular detachment. All participants were good candidates to pneumatic retinopexy (uncomplicated retinal detachments, with single or multiple retinal tears, less or equal to one clock hour size, located in the superior half of the retina).
What types of interventions were included*	All trials compared scleral buckling versus pneumatic retinopexy. Also, one of them[2] analized retinopexy options for scleral buckling and other surgical techniques such as vitrectomy.
What types of outcomes were measured	All trials reported reattachment of the retina with single intervention and the need of a second procedure to achieve it. Other reported outcomes were recurrence of retinal detachment at 6 months of follow-up, visual success, ocular adverse events and occurrence of proliferative vitreoretinopathy.Follow-up was for at least 6 months (6-90 months) in two trials[4,7], and of 4.3 months in the other trial[8].

* The information about primary studies is extracted from the systematic reviews identified, unless otherwise specified.

Methods

To answer the question, we used Epistemonikos, the largest database of systematic reviews in health, which is maintained by screening multiple information sources, including MEDLINE, EMBASE, Cochrane, among others, to identify systematic reviews and their included primary studies. We extracted data from the identified reviews and reanalyzed data from primary studies included in those reviews. With this information, we generated a structured summary denominated FRISBEE (Friendly Summary of Body of Evidence using Epistemonikos) using a pre-established format, which includes key messages, a summary of the body of evidence (presented as an evidence matrix in Epistemonikos), meta-analysis of the total of studies when it is possible, a summary of findings table following the GRADE approach and a table of other considerations for decision-making.

Summary of Findings

The information about scleral buckling versus pneumatic retinopexy is based on three randomized trials[4,7,8].

All trials reported reattachment of the retina with single intervention, including 238 eyes. Two trials reported recurrence of retinal detachment at 6 months and visual outcome at 6 months[4,7] (218 eyes). One trial reported visual success at 24 months[6].

Two trials[4,7] (218 eyes) reported ocular adverse events (vitreous hemorrhage, subretinal hemorrhage, vitreous or retinal incarceration, hyphema, retinal perforation) and development of proliferative vitreoretinopathy, which is the main cause of surgery failure. The summary of findings is as follows:

- Scleral buckling might be better than pneumatic retinopexy in achieving reattachment of the retina, but the certainty of the evidence is low.
- Scleral buckling might have a lower risk of recurrence of retinal detachment, but the certainty of the evidence is low.
- It is not clear whether pneumatic retinopexy improves visual success because the certainty of the evidence is very low.
- Pneumatic retinopexy might have less adverse ocular events, but the certainty of the evidence is low.
- It is not clear whether pneumatic retinopexy improves the development of proliferative vitreoretinopathy because the certainty of the evidence is very low.

Scleral buckle versus pneumatic retinopexy for rhegmatogenous retinal detachments

Patients Uncomplicated rhegmatogenous retinal detachments
Intervention Pneumatic retinopexy
Comparison Scleral buckling

Outcome	Absolute effect*		Relative effect (IC 95%)	Certainty of evidence (GRADE)
	WITH scleral buckle	WITH pneumatic retinopexy		
	Difference: eyes per 1000			
Reattachment of the retina (with single intervention)	826 per 1000	727 per 1000	RR 0.88 (0.76 to 1.01)	⨁⨁◯◯[1,2] Low
	Difference: 99 eyes less (Margin of error: 198 less to 8 more)			
Recurrence of retinal detachment (at 6 month follow-up)	133 por 1000	240 por 1000	RR 1.8 (1.0 to 3.24)	⨁⨁◯◯[1,2] Low
	Difference: 107 eyes more (Margin of error: 0 to 299 more)			
Visual outcome	Change in best corrected visual acuity was not quantitatively reported. One trial [7] reported that final best corrected visual acuity was better in eyes treated with scleral buckling (80% vs 90%). Another trial [4] reported that at 6 months there were more eyes with best corrected visual acuity better than 20/40 in the pneumatic retinopexy group (69% vs 53%), and at 24 months [6], in eyes with macula off for less than 14 days, more eyes in the pneumatic retinopexy group had best corrected visual acuity better than 20/50 (89% vs 67%).			⨁◯◯◯[1,2,3] Very low
Any adverse ocular event	133 per 1000	89 per 1000	RR 0.67 (0.32 to 1.42)	⨁⨁◯◯[1,2] Low
	Difference: 44 eyes less (Margin of error: 91 less to 56 more)			
Proliferative vitreoretinopathy	48 per 1000	45 per 1000	RR 0.94 (0.3 to 2.96)	⨁◯◯◯[1,4] Very low
	Difference: 3 eyes less (Margin of error: 33 less to 93 more)			

Margin of error: 95% confidence interval (CI).
RR: Risk ratio.
GRADE: Evidence grades of the GRADE Working Group (see later).
*The risk WITH scleral buckling is based on the risk in the control group of the trials. The risk WITH pneumatic retinopexy (and its margin of error) is calculated from relative effect (and its margin of error).
[1] The certainty of the evidence was downgraded in one level because trials did not provide the information to assess risk of bias, so it is unclear.
[2] The certainty of the evidence was downgraded in one level due to imprecision of the results, because the confidence interval includes both effect and no effect.
[3] We downgraded the certainty of the evidence in one level for inconsistency, because some trials reported opposite results.
[4] We downgraded the certainty of the evidence in two levels due to imprecision, because the confidence interval is too wide and includes both effect and no effect.

Follow the link to access the interactive version of this table (Interactive Summary of Findings – iSoF)

About the certainty of the evidence (GRADE)*

⊕⊕⊕⊕
High: This research provides a very good indication of the likely effect. The likelihood that the effect will be substantially different† is low.

⊕⊕⊕◯
Moderate: This research provides a good indication of the likely effect. The likelihood that the effect will be substantially different† is moderate.

⊕⊕◯◯
Low: This research provides some indication of the likely effect. However, the likelihood that it will be substantially different† is high.

⊕◯◯◯
Very low: This research does not provide a reliable indication of the likely effect. The likelihood that the effect will be substantially different† is very high.

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* This concept is also called 'quality of the evidence' or 'confidence in effect estimates'.

† Substantially different = a large enough difference that it might affect a decision

Other considerations for decision-making

To whom this evidence does and does not apply

The presented evidence applies to rhegmatogenous retinal detachments in both phakic and non phakic eyes (aphakic and pseudophakic), with or without macular detachment, that are good candidates for pneumatic retinopexy (uncomplicated retinal detachments, with single or multiple retinal tears less or equal to one clock hour size, located in the superior half of the retina).

We could not identify if effects were different when comparing subgroups of patients (phakic and non phakic eyes, with macula on or macula off), because the existing evidence is very limited and systematic reviews did not report this analysis.

About the outcomes included in this summary

The outcomes presented in the summary of findings table are those considered critical for decision-making, according to the opinion of the authors of this summary. In general, they coincide with the outcomes reported by the systematic reviews identified. One exception was the need of a second procedure to achieve retinal reattachment, outcome reported by all systematic reviews but not by the authors of this summary.

It is important to note that visual outcome is determined by the presence of macular detachment and the time of evolution of this finding (less than 14 days). This analysis was not performed in the identified systematic reviews.

Balance between benefits and risks, and certainty of the evidence

Even though the certainty of the existing evidence is low; scleral buckling appears to be better in terms of reattachment of the retina with a lower risk of recurrence of the retinal detachment, but pneumatic retinopexy has less ocular adverse events, which could be related to the characteristics of this technique (minimally invasive).

It is not possible to make an adequate balance between benefits and risks because of the existing uncertainty.

Resource considerations

None of the systematics reviews considered an economic analysis within its outcomes, but in general, scleral buckling is more expensive than pneumatic retinopexy.

Even though there may be some benefits, it was not possible to make a balance between benefits and economic cost, because of the uncertainty of the evidence available.

What would patients and their doctors think about this intervention

Faced with the evidence presented in this summary, the decisions made by clinicians might not change because of the uncertainty of the information available.

Even though clinicians usually prefer scleral buckling over pneumatic retinopexy, this second technique is less expensive and carries a lower risk, so there may be a renovated interest in this procedure.

Differences between this summary and other sources

The conclusions of this summary agree with those presented by the different systematic reviews identified in relation to reattachment of the retina and visual outcome. As only one systematic review[1] reported the other outcomes, our results coincide with the ones presented in that review.

We did not identify international guidelines about retinal detachment, but some evidence-based reviews[13] include scleral buckling or classic surgery, pneumatic retinopexy and vitrectomy as first line treatment options for rhegmatogenous retinal detachment.

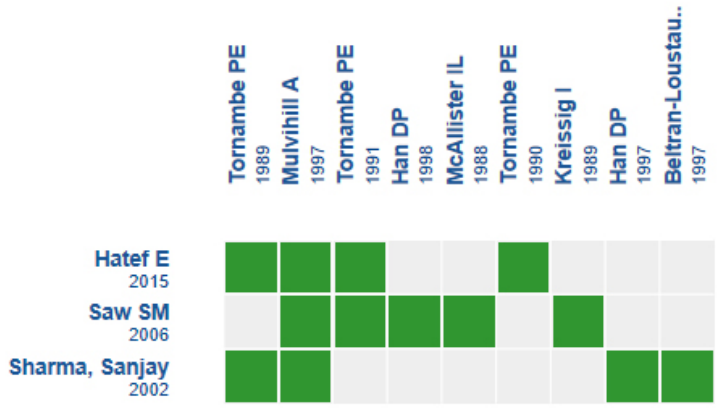
Could this evidence change in the future?

The probability that future research changes the conclusions of this summary is high, due to the uncertainty of the existing evidence.

We did not identify ongoing randomized trials comparing both interventions in the International Clinical Trials Registry Platform of the World Health Organization, or ongoing systematic reviews in PROSPERO database.

How we conducted this summary

Using automated and collaborative means, we compiled all the relevant evidence for the question of interest and we present it as a matrix of evidence.



An evidence matrix is a table that compares systematic reviews that answer the same question.
Rows represent systematic reviews, and columns show primary studies.
The boxes in green correspond to studies included in the respective revisions.
The system automatically detects new systematic reviews including any of the primary studies in the matrix, which will be added if they actually answer the same question.

Follow the link to access the **interactive version:** Scleral buckle versus pneumatic retinopexy for rhegmatogenous retinal detachments

Notes

The upper portion of the matrix of evidence will display a warning of "new evidence" if new systematic reviews are published after the publication of this summary. Even though the project considers the periodical update of these summaries, users are invited to comment in *Medwave* or to contact the authors through email if they find new evidence and the summary should be updated earlier.

After creating an account in Epistemonikos, users will be able to save the matrixes and to receive automated notifications any time new evidence potentially relevant for the question appears.

This article is part of the Epistemonikos Evidence Synthesis project. It is elaborated with a pre-established methodology, following rigorous methodological standards and internal peer review process. Each of these articles corresponds to a summary, denominated FRISBEE (Friendly Summary of Body of Evidence using Epistemonikos), whose main objective is to synthesize the body of evidence for a specific question, with a friendly format to clinical professionals. Its main resources are based on the evidence matrix of Epistemonikos and analysis of results using GRADE methodology. Further details of the methods for developing this FRISBEE are described here (http://dx.doi.org/10.5867/medwave.2014.06.5997)

Epistemonikos foundation is a non-for-profit organization aiming to bring information closer to health decision-makers with technology. Its main development is Epistemonikos database

www.epistemonikos.org.

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