



# **Scleral Buckling: Where we are, Choice from World Over**

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## **Authors' contributions**

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

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## **ABSTRACT**

The purpose of this study is to summarize the latest reports on the management of rhegmatogenous retinal detachment and to suggest management guidelines for choosing a surgical method in patients with rhegmatogenous retinal detachment. Most rhegmatogenous retinal detachments led to full retinal detachment and vision loss in the affected eye prior to the period of scleral buckling (SB). Scleral buckling was developed in the 1950s, allowing surgeons to treat rhegmatogenous retinal detachment surgically. The study gave questionnaire to 109 retinal surgeons from 18 different countries like Europe, America, and Asia etc. Surgical management of eyes with rhegmatogenous retinal detachment associated with proliferative vitreoretinopathy (PVR)

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depends on the location and extent of membranes. Pars plana vitrectomy is needed for eyes with posterior and extensive anterior epiretinal proliferations with or without subretinal strands to remove the contractile membranes and release the resultant retinal shortening.

**Keywords:** *Rhegmatogenous retinal detachment; surgical management; epiretinal proliferations; vitreoretinal traction.*

## 1. INTRODUCTION

“Rhegmatogenous retinal detachment (RRD) is a potentially blinding condition that occurs when the inner neurosensory retina separates from the outer retinal pigment epithelium due to a breach in the sensory retina’s structural integrity” [1]. “The creation of a retinal break, vitreoretinal traction, and liquefied vitreous entry through the breach results in primary rhegmatogenous retinal detachment” [2]. “Rhegmatogenous retinal detachment has a prevalence of 6.3 to 17.9 per 100,000, with those in their sixties having the highest incidence” [1,3,4]. “Most rhegmatogenous retinal detachments led to full retinal detachment and vision loss in the affected eye prior to the period of scleral buckling (SB). Scleral buckling was developed in the 1950s, allowing surgeons to treat rhegmatogenous retinal detachment surgically” [5,6].

Even after the advent of pars plana vitrectomy (PPV), which was introduced as a new treatment option by Robert Machemer [7], scleral buckling had been the standard technique for rhegmatogenous retinal detachment for several decades, and pars plana vitrectomy (PPV) was considered as a supplemental procedure to scleral buckling in complicated cases, such as proliferative vitreoretinopathy (PVR). “Evolution of vitrectomy machines and related instruments has significantly increased the number of pars plana vitrectomies in recent years” [8-12].

“There have been several clinical trials comparing the two methods” [13-18]. The scleral buckling vs. primary vitrectomy in rhegmatogenous retinal detachment (SPR) study [18] was the largest randomized clinical trial, and it showed that anatomic and functional outcomes of the two methods were comparable. Apparently, pars plana vitrectomy (PPV) has become more popular as the primary procedure for management of rhegmatogenous retinal detachment. Scleral buckling is sometimes considered an uncomfortable outdated operation for the surgeon compared to pars plana vitrectomy (PPV), as it required more anesthesia and repeated taking on and off the indirect

ophthalmoscope. In addition, scleral buckling might induce change of refractive errors or diplopia postoperatively. Nevertheless, scleral buckling has apparent merits over pars plana vitrectomy (PPV) in selected cases.

The purpose of this study is to summarize the latest reports on the management of rhegmatogenous retinal detachment and to suggest management guidelines for choosing a surgical method in patients with rhegmatogenous retinal detachment.

## 2. MATERIALS AND METHODS

We did a survey regarding management of rhegmatogenous retinal detachment whether retinal surgeons prefer scleral buckling or vitrectomy. We gave questionnaire to 109 retinal surgeons from 18 different countries like Europe, America, and Asia etc.

## 3. RESULTS AND DISCUSSION

The questionnaire had following questions:

1. Do you perform scleral buckling?

91.7% retinal surgeons perform scleral buckling and 6.4% do not.

2. Is scleral buckling procedure of choice for rhegmatogenous retinal detachment if rhegmatogenous retinal detachment fits in criteria for scleral buckling?

85.3% said yes and 11.9% said no.

3. What is your preference: Scleral buckling or vitrectomy, if rhegmatogenous retinal detachment fits in criteria of scleral buckling?

66% said that they will do vitrectomy and 41.3% said that they will do scleral buckling.

4. How many scleral buckling you do for rhegmatogenous retinal detachment in a month?

68.8% retinal surgeons said that they do 5 or less than 5 scleral buckling for rhegmatogenous retinal detachment in a month while 22% said

that they do more than 5 scleral buckling for rhegmatogenous retinal detachment in a month.

5. How many Vitrectomies you have performed for rhegmatogenous retinal detachment that fits in criteria of scleral buckling in a month?

28.4% retinal surgeons said that they do 5 or less than 5 vitrectomies for rhegmatogenous retinal detachment that fits in criteria of scleral buckling in a month, 17.4% said that they do more than 5 vitrectomies, 33% said that they do not do vitrectomies for rhegmatogenous retinal detachment that fits in criteria of scleral buckling while 16.5% did not answer the question.

6. How many Vitrectomies you have done for all sort of rhegmatogenous retinal detachment in a month?

75.2% said 5 or less than 5 while 7.3% said more than 5.

Surgical management of eyes with rhegmatogenous retinal detachment associated with proliferative vitreoretinopathy (PVR) depends on the location and extent of membranes. Pars plana vitrectomy is needed for eyes with posterior and extensive anterior epiretinal proliferations with or without subretinal strands to remove the contractile membranes and release the resultant retinal shortening. Lewis et al [12] reported that “during vitrectomy for proliferative vitreoretinopathy (PVR) with pre- and sub-retinal proliferations, only 28% of subretinal strands required special surgical therapy such as removal or transection, and the remainder did not interfere with conventional reattachment maneuvers. Moreover, the visual prognosis was reasonably good in the majority of patients that did not require removal or transection of the strands”.

“On the other hand, if subretinal strand removal was necessary, the anatomic and visual outcomes were relatively poor with only 65% chance of final success and 20% chance of return to the ambulatory vision. The treatment of choice in eyes with proliferative vitreoretinopathy (PVR) associated with isolated subretinal proliferations (i.e., without preretinal membranes) is not clear. Wallyn and Hilton reported retinal reattachment rate of 95% with scleral buckling surgery in 20 eyes with isolated subretinal proliferation”. [19,20,21]

Yao et al reported “results of scleral buckling surgery in 40 eyes with rhegmatogenous retinal

detachment and subretinal proliferation. Four eyes in their series had a small local preretinal membrane but without evidence of a starfold. In two eyes, the retina was not reattached and vitrectomy was performed. In one eye, the surgery was terminated after a narrow funnel-shaped retinal detachment was more clearly visualized after cataract surgery. The single surgery anatomical success was 90%”.

Our results compare favorably with those reported by Yao et al, with a single surgery anatomical success rate of 88.7%. In our study, however, the retina was attached in all eyes immediately after surgery. The reason for redetachment was the development of proliferative vitreoretinopathy (PVR) in four eyes and a missed retinal break in another eye. Moreover, the scleral buckling surgery was successful in all eyes with proliferative vitreoretinopathy (PVR) CA1 at the baseline.

“In these eyes, retinal reattachment and closure of retinal breaks resulted in the arrest of the epiretinal proliferation process, and the placement of an encircling buckle for an anterior proliferative vitreoretinopathy (PVR) effectively released the retinal traction exerted by the epiretinal proliferation. There is no standard grading system for classification of the severity of the subretinal proliferation”. [22,23]

We arbitrarily graded the subretinal proliferation based on the quadrants of proliferation. No correlation was found between the number of involved quadrants and the need for additional vitrectomy. “Pars plana vitrectomy in patients with rhegmatogenous retinal detachment associated with subretinal proliferations requiring subretinal surgery may be associated with significant intraoperative complications including choroidal or retinal hemorrhage, subretinal air, and unplanned extension of the retinotomies. Furthermore, after vitrectomy, long-term intraocular tamponade with silicone oil or C3F8 is required. Intraocular tamponade can cause considerable lens opacity, necessitating cataract surgery in these patients, who are often young. Scleral buckling surgery, on the other hand, has a high anatomical success rate and is still a feasible treatment option for rhegmatogenous retinal detachment associated with subretinal proliferations with or without mild anterior proliferative vitreoretinopathy (PVR)”. [24,25]

Previous research has found that depending on the preoperative refractive status, surgical method, buckle height, and other factors can

lead to refractive error changes after scleral buckling surgery. We discovered that the amount of refractive error before and after surgery was statistically identical. Nonetheless, after stabilizing refractive error in the eyes with buckle-induced refractive surgery, laser refractive surgery may be conducted safely.

#### 4. CONCLUSION

In this study we concluded that most of the retinal surgeons prefer scleral buckling as the procedure of choice for rhegmatogenous retinal detachment than vitrectomy as it gives a higher anatomical success rate with less pre- and post-operative complications.

#### CONSENT AND ETHICAL APPROVAL

It is not applicable.

#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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