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**Original Research Paper**

# Visual outcome of scleral buckling surgery in rhegmatogenous retinal detachment in a tertiary eye care center

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**ABSTRACT**

**Background:** A rhegmatogenous retinal detachment (RRD) occurs when a tear in the retina leads to fluid accumulation with a separation of the neurosensory retina from the underlying RPE. the presence of macular involvement,duration of detachment and PVR are the most important factors when it comes to restoring visual acuity. Present study was undertaken to assess different aspects of scleral buckling surgery in rhegmatogenous retinal detachment and to evaluate associated risk factors with it .It is also undertaken to evaluate complications of scleral buckling surgery and factors affecting it outcome.

**Materials and Methods:** The present study was combined retrospective and prospective interventional study conducted in a tertiary eye care center, during the period of January 2018 to December 2020 in which 100 eyes of 100 patients were evaluated. Patient presented with rhegmatogenous retinal detachment that were treated by Scleral buckling procedure were included in the study.

**Results:** 100 eyes of 100 patients were evaluated, maximum no of cases 55% were of age group 21-40yrs with 85% of males ,55% of cases had macula OFF and 45% had ON, 5%were having Postoperatively VA (UCVA) at 6 month in range of CF2FT to 6/60, 95% were having postoperatively attached retina,5% had detached retina.

**Conclusion:** Scleral buckling Surgery showed good structural and visual outcome, despite an increasing trend toward primary vitrectomy for RRD, improvement of visual acuity was found to correlate well with the shorter duration of macular detachment and the status of the lens with a better outcome in phakic eyes.

**Keywords:** Visual outcome, retinal detachment, scleral buckling

## 1. INTRODUCTION

Jules Gonin performed the first successful retinal detachment surgery after accurate localization of retinal breaks, drainage of SRF and thermocautery in the beginning of the last century.[1] Building on his theories, Ernst Custodis performed the first scleral buckling surgery in 1949.[2] In the last 50 years techniques in scleral buckling, pneumatic retinopexy and vitrectomy have made the repair of retinal detachments more manageable with better visual outcomes. A rhegmatogenous retinal detachment (RRD) occurs when a tear in the retina leads to fluid accumulation with a separation of the neurosensory retina from the underlying RPE; this is the most common type of retinal detachment. Lattice degeneration is considered the most important peripheral retinal degeneration process that predisposes to a rhegmatogenous retinal detachment. Other peripheral lesions predisposing to retinal detachment include meridional folds and complexes, and cystic retinal tufts. three main techniques are currently used to treat RRD: 1) scleral buckle surgery; 2) pars plana vitrectomy with retinopexy and intravitreal tamponade and 3) pneumatic retinopexy. the goal is to create an inward indentation of the eye wall, thus approximating the retinal pigment epithelium to the neurosensory retina surrounding the break. Scleral indentation is achieved by the placement of a permanent episcleral explant/buckle at a location corresponding to the retinal break. The buckle is permanently anchored to the sclera, typically with non-dissolvable sutures. Buckle materials include silicone sponge and hard silicone that come in a variety of shapes and sizes. The exact type of buckle required varies according to

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the desired buckle (scleral indentation) height, and location and number of breaks. Postsurgical visual outcomes relate to the extent of initial macular involvement. The retina is reattached in 90 percent of cases, with success rates nearing 100 percent in certain case series. However, there is a significant difference between favorable anatomic correction and functional visual outcomes. The presence of macular involvement, duration of detachment and PVR are the most important factors when it comes to success in restoring visual acuity. Present study was undertaken to assess different aspects of scleral buckling surgery in rhegmatogenous retinal detachment and to evaluate associated risk factors with it .It is also undertaken to evaluate complications of sclera buckling surgery and factors affecting it outcome.

**AIMS AND OBJECTIVES**

- To evaluate the profile of patients of Rhegmatogenous retinal detachment undergoing Scleral Buckling surgery.
- To evaluate the associated risk factors of Rhegmatogenous retinal detachment.
- To evaluate the visual outcome, factors affecting outcome and complications of Scleral Bukling surgery in Rhegmatogenous retinal detachment.
- To evaluate approximate period of recovery for Scleral Buckling surgery.

## 2. MATERIALS AND METHODS

The present study was combined retrospective and prospective interventional study conducted in a tertiary eye care center, Bhopal during the period of January 2018 to December 2020 in which 100 eyes of 100 patients were evaluated.

**Selection of cases**

Patient presented with Rhegmatogenous retinal detachment that were treated by Scleral buckling procedure were included in the study.

**Inclusion criteria**:

(a) Patient with depressible breaks.
(b) PVR<C1.

**Exclusion criteria:**

(a) Large horseshoe tears / giant retinal tears.
(b) PVR >C1.
(c) Macular pucker.
(d) Breaks not localized.
(e) Non-Depressible breaks.
(f) Previously operated for retinal detachment

**Preoperative Evaluation**

Detailed ocular examination was done, visual acuity in each eye was measured using snellen's distant vision chart ,intraocular pressure was measured by applanation tonometer.each patient underwent a slit lamp biomicroscopy to see intraocular lens status and posterior lens capsule status, Fundus examination with Direct and Indirect Ophthalmoscope (20 D lens) in order to identify retinal breaks at baseline and there fundus diagram were drawn in retinal chart.

Charting of the type and extent of detachment, status of macula, location and number of primary and other breaks and presence and severity of PVR as per the PVR classification of The Retina society of India

**Retina society PVR Classification**

| Grade (stage) | Characteristics |
|---|---|
| **A** | Vitreous haze, vitreous pigment clumps. |
| **B** | Wrinkling of the inner retinal surface, rolled edges of retinal break, retinal stiffness, vessel tortuosity. |
| **C** | Full thickness retinal folds in |
| **C-1** | One quadrant |
| **C-2** | Two quadrants |
| **C-3** | Three quadrants |
| **D** | Fixed retinal folds in four quadrants |
| **D-1** | Wide funnel shape |
| **D-2** | Narrow funnel shaped |
| **D-3** | Closed funnel |

ISSN:0975-3583,0976-2833 VOL13,ISSUE03,2022

**Surgical Steps:** Standard protocol for scleral buckling procedure was followed.
**Scleral buckle surgery was done in following steps, as follows:**
**(a) Preparation and Drape**
**(b) Conjunctival peritomy and isolation of rectus muscles.**
**(c) External localization of all retinal breaks**
**(d) Treat break(s)—cryotherapy-**
**(e) Decide on buckle type and location**
Episcleral implants can be segmental or encircling in configuration.
**Encircling episcleral buckles**
If a 360 degree encircling circumferential buckle of modest width and height is desired, an encircling 240, or other silicone band is passed around the circumference of the globe and beneath the rectus muscles. The band is traditionally anchored with a single mattress suture with bites parallel to the limbus placed in the center of each quadrant. Although they are an elegant and effective means of securing a band, scleral tunnels are usually not employed by most surgeons. Suture bites that straddle a silicone band should be placed just far enough apart to allow the band to move freely beneath the suture, and this distance equals the width of the band plus two-times its thickness
**(f) Management of subretinal fluid**
**(g) Place and secure buckle.** .
**(h) Retinal examination.**
**(i) Conjunctiva and Tenon's capsule closure**
**Follow up:**
All patients were followed up on first postoperative day, at time of discharge and at 2 week , 3 and 6 month under following heads-
Visual acuity, Postoperative astigmatic error was noted at time of refraction, IOP, lens status and, fundus examination. Postoperative complications, refractive change, motility disturbances, vitreous or retinal incarceration, suprachoroidal or subretinal hemorrhage, migration of buckling elements, Ischemia of the anterior segment of eye (from the use of encircling bands; often revealed by corneal edema or clouding ,were also recorded. Only patients who completed 6 months of follow-up were included in the final analyses.

## 3. RESULTS

The observations made in study can be summarized as follows;
Maximum no of cases 55% were of age group 21-40yrs with 85% of males and in 65% of cases Right eye was involved. all the cases presented with complaint of diminution of vision. out of total cases 60% were emetropic,30% were myopic,80% were phakic,20% were pseudophakic. 55% of cases had macula OFF and 45% had ON,85% had no PVR ,50% had SUBTOTAL RD,20% had INFERIOR RD,10% had SUPERIOR and TEMPORAL RD, 5% had TOTAL and INFEROTEMPORAL RD,45% had break in SUPEROTEMPORAL QUADRANT,30% in INFEROTEMPORAL QUADRANT,15% in SUPERONASAL QUADRANT ,10% in INFERONASAL QUADRANT,80% had Tear, 45% had Holes,5% dialysis,10% had Intraoperative complication of Raised IOP,5% Subretinal haemorrhage ,5% Choroidal haemorrhage,50% had Postoperative complication of Raised IOP ,35% had Residual SRF,20%PVR with vitreous haemorrhage,5%Redetachment,5%squint,5% sclera perforation,95% were operated in local anesthesia and 5% in general anesthesia,50% were having preoperative visual acuity (UCVA)in range of CF2FT to 6/60,20% had HM+,15% had CF<2FT ,10% had PL+,5%>6/60,70% were having Postoperatively VA (UCVA) on day 1 in range of CF2FT to 6/60 ,20% had CF<2FT,10% had HM,65% were having Postoperatively VA (UCVA) on second week in range of CF2FT to 6/60 ,25% had >6/60,10% had CF<2FT,95% were having Postoperatively VA (UCVA) at 3 month in range of CF2FT to 6/60,5% had CF<2FT,85%were having Postoperatively VA (UCVA) at 6 month in range of CF2FT to 6/60,3% had >6/60,50% were having postoperative IOP digitally raised ,45% had digitally normal ,5% had digitally low,95% were having postoperatively attached retina,5% had detached retina,75% SRF drainage had done,25% not done,95% additional procedure had not been required .

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**TABLE 1- DISTRIBUTION OF PATIENTS**

| **Type of break** | **Number** | **Percentage** | **I/O complication** | **Number** | **Percentage** |
|---|---|---|---|---|---|
| No break | 0 | 0% | Subretinal h'ge | 5 | 5% |
| Tear | 80 | 80% | Retinal perforation | 0 | 0% |
| Holes | 45 | 45% | Vitreous h'ge | 0 | 0% |
| Dialysis | 5 | 5% | Choroidal h'ge | 5 | 5% |
| **Postoperative CO.** | **Number** | **Percentage** | Disc hemorrhage | 0 | 0% |
| Raised IOP | 50 | 50% | Raised IOP | 10 | 10% |
| Redetachment | 5 | 5% | **UCVA (preop.)** | **Number** | **Percentage** |
| PVR with vitreous hg | 20 | 20% | PL+ | 10 | 10% |
| Epiretinal membrane | 0 | 0% | HM | 20 | 20% |
| Residual SRF | 35 | 35% | CF<2FT | 15 | 15% |
| double vision | 5 | 5% | CF2FT to 6/60 | 50 | 50% |
| Scleral perforation | 5 | 5% | >6/60 | 5 | 5% |
| **UCVA on 1st POD** | **Number** | **Percentage** | **UCVA at 2nd wk** | **Number** | **Percentage** |
| PL+ | 0 | 0% | PL+ | 0 | 0% |
| HM | 10 | 10% | HM | 0 | 0% |
| CF<2FT | 20 | 20% | CF<2FT | 10 | 10% |
| CF2FTto 6/60 | 70 | 70% | CF2FTto 6/60 | 65 | 65% |
| >6/60 | 0 | 0% | >6/60 | 25 | 25% |
| **UCVA at 3month** | **Number** | **Percentage** | **UCVA at 6 month** | **Number** | **Percentage** |
| PL+ | 0 | 0% | PL+ | 0 | 0% |
| HM | 0 | 0% | HM | 0 | 0% |
| CF<2FT | 5 | 5% | CF<2FT | 0 | 0% |
| CF2FT to 6/60 | 95 | 95% | CF2FTto 6/60 | 85 | 85% |
| >6/60 | 0 | 0% | >6/60 | 15 | 15% |

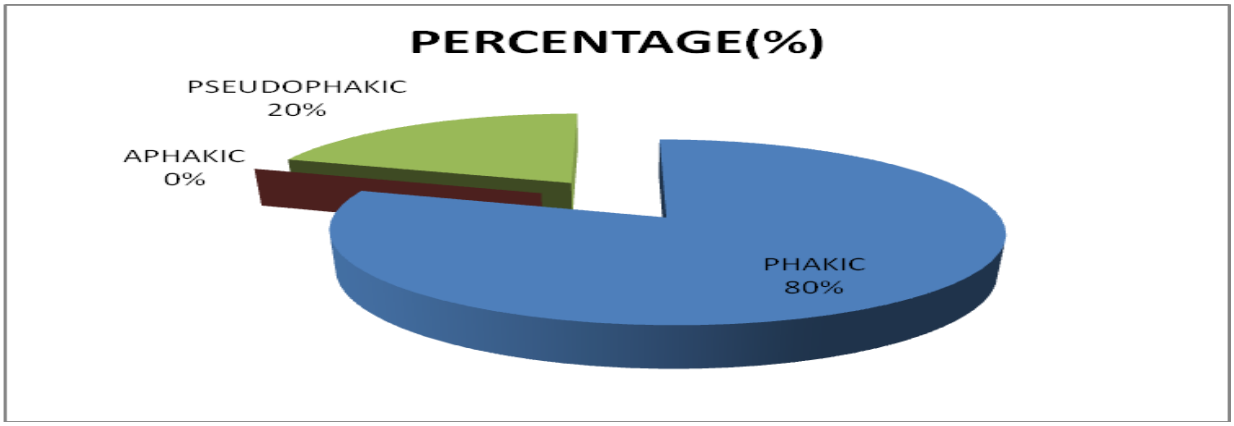


**Fig.1 Distribution of patients according to lens status**

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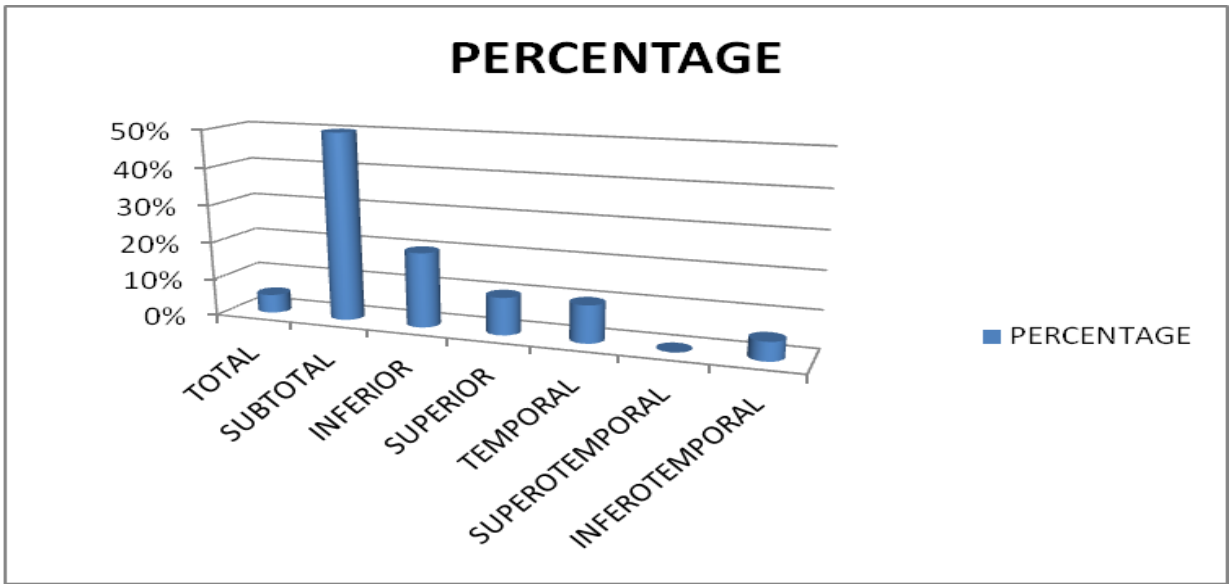


**Fig.2 Distribution of patients according to extent of detachment**

## 4. DISCUSSION

The present study was conducted at Tertiary eye care hospital, Bhopal, Madhya Pradesh between January 2018 to December 2020 to evaluate visual outcome of scleral Buckling surgery ,different aspects of scleral buckling surgery in Rhegmatogenous retinal detachment and to evaluate associated risk factors with it .It is also undertaken to evaluate complications of scleral buckling surgery and factors affecting its outcome.

In all of the cases, 360° scleral buckle was done, and in few cases, additional radial bands were added when there was more than one break in different levels. In most of the cases external SRF drainage was performed, and non drainage procedure was done in cases with shallow RD, retinopexy was done in all cases using cryotherapy, and intraocular gas tamponade was done,.scleral buckling surgery was chosen whenever we have a single break, or multiple breaks that can be tethered by a circumferential buckle, young phakic patients with clear media were preferred candidates, especially in the absence or minimal PVR.

Drainage of SRF was chosen in most of the cases, though the literature supports the high success rate of nondrainage approach,[3] but the authors felt it is more convenient to drain in all of the cases except when the retina could be reattached with preoperative ocular rest or if the retinal break could be closed without drainage at the time of surgery, this approach was adopted because of the low complication rate.[4] and to avoid the problems of delayed absorption of SRF after scleral buckling procedure, especially the marked increase in the intraocular pressure postoperatively, in particular, in eyes with a history of glaucoma, recent wound, or presence of staphyloma.The cost of the procedure in India is much less expensive than vitrectomy, Cost is not the only reason, the reduced risk, and the need to remove silicone oil if it was injected with vitrectomy, cataract, infections, the risk of re-RD following silicon oil removal are some of the other reasons to avoid vitrectomy.

This study shows that scleral buckle surgery for RRD gives sufficient anatomical and visual outcomesit is minimally invasive procedure compared to pars plana vitrectomy, with slight reaction to intraocular inflammation, cheaper, with less risk of complications, especially with young adults where preservation of lens clarity is extremely important. The mean duration of symptoms before presentation had significantly affected the visual outcome and increased the number of cases with PVR, and this is not unconnected to problems of diagnosis, late referrals, shortage of nearby ophthalmic facilities and financial status. Phakic eyes gave a better outcome than aphakic and pseudophakic eyes. These results were consistent with a study done by Heimann *et al*.,[5] comparing scleral buckling versus primary vitrectomy in RRD, it showed the greater benefit of scleral buckles in phakic eyes with respect to BCVA improvement. Another study done by Hejsek *et al*., among 17 patients with RRD with the primary anatomic success of 94% with an average best-corrected visual acuity postoperatively of 20/50.[6]Another study done by Oluleye *et al*.,[7] also showed anatomical attachment success in 40 eyes (90.9%) at the 1st day postoperatively and in 32 eyes (86.5%) at 6 weeks after scleral buckle surgery. In a study done on 43 eyes of patients who underwent scleral buckling and cryopexy, anatomic success was achieved in 95.3% of eyes.[8]

The visual improvement rate after scleral buckling surgery was affected by the duration of RD and macular involvement. Patients who had a duration of the macular detachment of 30 days or less had a statistically significant

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improvement in visual acuity than those who had more than 30 days of RD That means the sooner the surgery for macula off detachment is done, the better the results until after 30 days where there was no difference in the visual outcome. In this study, analysis showed that the visual outcome of scleral buckling surgery was not affected by the extent of retinal detachment, number of breaks, the presence or absence of lattice degeneration, whether SRF was drained or not, or whether an intraocular gas tamponade was injected or not during the surgery.A meta-analysis of randomized controlled clinical trials of primary vitrectomy versus scleral buckling for the treatment of RRD of 523 phakic eyes, 690 eyes showed that scleral buckle is superior in terms of final visual acuity in uncomplicated phakic RRDs. PPV is more likely to achieve a favorable final re-attachment in pseudophakic/aphakic RRD.[9]On the other hand, some studies comparing vitrectomy versus scleral buckling for RRD showed higher primary anatomic success rates for vitrectomy with a lower risk of reoperation, like a retrospective study done in Finland.[10]
This study has limitations because of its retrospective nature and low sample size.

## 5. CONCLUSION

Scleral buckling Surgery showed good structural and visual outcome, despite an increasing trend toward primary vitrectomy for RRD, improvement of visual acuity was found to correlate well with the shorter duration of macular detachment and the status of the lens with a better outcome in phakic eyes more than aphakic and pseudophakic eyes.

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