Refractive Changes Following Scleral Buckle Surgery for Rhegmatogenous Retinal Detachment Based on Type of Implant Used

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Background

- Scleral buckling surgery has been used in management of rhegmatogenous retinal detachment (RRD) since the 1950’s\(^1\)
- The technique has a reattachment rate of 94%\(^2\)
  - vs. Pars plana vitrectomy 92%\(^2\) and pneumatic retinopexy 64%\(^2\)
- Scleral buckling surgery has decreased in use as vitrectomy is more comfortable post-operatively, and pneumatic retinopexy has become more popular
- The significant refractive changes\(^3,4\) following scleral buckle surgery also play a role in the decreased use
  - These changes are thought to arise for axial length changes, astigmatism induction and high order aberrations\(^3,5,6\)
- Vitrectomy may not be ideal in some patients due to the increased risk of cataract formation such as young phakic patients
- Pneumatic retinopexy may not be optimal in inferior detachments or difficulty with compliance\(^7\)
Background

• Scleral buckle surgery
  • Localized indentation of the sclera, choroid, and pigment epithelium beneath a retinal break
  • Reduction of vitreoretinal traction by displacing the eye wall and retina centrally
  • seal retinal break
    • usually with cryotherapy
  
segmental buckle: intraoperative photo of a silicone sponge affixed to sclera with 5-0 nylon suture.

encircling buckle: post operative photo of an encircling scleral buckle in a 34 year old myopic patient

radial buckle: post operative photo of a 61 year old patient with nasal retinal detachment
Purpose

• To evaluate refractive changes after scleral buckle surgery for rhegmatogenous retinal detachment, and compare outcomes of radial, segmental and encircling scleral buckle techniques.
Study Design

- Retrospective chart review of patients undergoing rhegmatogenous retinal detachment (RRD) treated with primary scleral buckle (SB) by nine different surgeons at Columbia University Medical Center.

- Pre-operative and post-operative refraction, pre-operative and post-operative best corrected visual acuity (BCVA), and re-operation rates were recorded.

- Configuration of retinal detachment and type of element used was also compared.

- Change in spherical equivalent (SE change) was compared between patients undergoing radial, segmental and encircling scleral buckle surgery.
Demographics

- A total of 47 eyes were reviewed.

<table>
<thead>
<tr>
<th>Demographics</th>
<th>Total n= 47</th>
<th>Radial SB n= 9</th>
<th>Segmental SB n= 20</th>
<th>Encircling SB n= 18</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>29 (62%)</td>
<td>5 (56 %)</td>
<td>14 (70%)</td>
<td>11 (61%)</td>
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<tr>
<td>Female</td>
<td>18 (38%)</td>
<td>4 (44%)</td>
<td>6 (30%)</td>
<td>7 (39%)</td>
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<tr>
<td>OD</td>
<td>27 (57%)</td>
<td>4 (44%)</td>
<td>12 (60%)</td>
<td>11 (61%)</td>
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<tr>
<td>OS</td>
<td>20 (43%)</td>
<td>5 (56%)</td>
<td>8 (40%)</td>
<td>7 (39%)</td>
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<tr>
<td>Macula on RRD</td>
<td>33 (70%)</td>
<td>7 (78 %)</td>
<td>14 (70%)</td>
<td>11 (61%)</td>
</tr>
<tr>
<td>Macula off RRD</td>
<td>14 (30%)</td>
<td>2 (12%)</td>
<td>6 (30%)</td>
<td>7 (39%)</td>
</tr>
<tr>
<td>Avg. Age (years)</td>
<td>48.19</td>
<td>56.02</td>
<td>52.12</td>
<td>39.83</td>
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</table>
Results

Post-op Spherical Equivalent Mean Change

<table>
<thead>
<tr>
<th>t-test</th>
<th>P value</th>
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<tbody>
<tr>
<td>SE avg change radial vs encircling</td>
<td>0.0003</td>
</tr>
<tr>
<td>SE avg change segmental vs encircling</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>avg change radial vs segmental</td>
<td>0.66</td>
</tr>
</tbody>
</table>
Results

• There was a greater myopic shift in encircling scleral buckle repair of RRD (mean pre-operative to post-operative SE change of -3.05D) when compared to segmental (SE change -0.42D p <0.001) and radial (SE change -0.19D p= 0.0003) scleral buckle repair.

• No significant difference was noted between segmental and radial scleral buckles (p=0.66).

• There was no significant difference between the 3 groups in terms of pre-operative BCVA, post-operative BCVA and reoperation rates (all p-values >0.1)

• The overall success rate was 89% with primary scleral buckle repair. The most common surgical complication was epiretinal membrane (4%)
Conclusion

• Scleral buckle surgery remains an effective way to treat rhegmatogenous retinal detachments.

• Radial and segmental techniques of scleral buckle demonstrated significantly less refractive changes than encircling buckles, with no differences in post-operative BCVA or retinal attachment status.

• A radial or encircling buckle may be the best choice in a patient with high refractive demands such as those who are post-refractive surgery or with a multi focal IOL

• Patients who wish to preserve accommodation or those who must travel or cannot position may also benefit from this technique.
References


