Scleral buckling versus vitrectomy for primary rhegmatogenous retinal detachment

Aditya Maitray¹, V Jaya Prakash² and Dhanashree Ratra³

Introduction

Retinal detachment (RD) surgery is the most common retinal surgery performed. RD can be repaired either by scleral buckling (SB) or pars plana vitrectomy (PPV). Pneumoretinopexy, laser delimitation or observation can be done in selected cases. The decision to perform SB or vitrectomy depends on various factors, including age of the patient, duration and extent of RD, presence of proliferative vitreoretinopathy (PVR) changes, the number, location and size of retinal breaks and the lens status. Other factors which influence the decision are availability of operating room equipment or staff, various patient factors (especially expected compliance with positioning after surgery) and surgeon preference.¹ Until about a decade ago, SB was the preferred procedure, but there is a general trend towards vitrectomy with the development of newer technology. There are several retrospective and prospective studies which compare SB and vitrectomy for primary RD. The anatomical and visual outcomes following retinal reattachment surgeries reported in the recent peer-reviewed literature will be discussed in this article.

Scleral buckling

SB provides target-oriented retinal attachment. It is ideally suited for detachments with anterior retinal breaks and dialysis. It is also a very rewarding surgery for suitable paediatric RDs wherein PVD induction during PPV is a challenge. It is efficacious for both superior and inferior breaks, does not cause cataract, does not require postoperative positioning, unless gas or air is injected, and has a high single-surgery success rate (SSSR). Success rate can be further improved by meticulous preoperative and intraoperative search for breaks. Chandelier-assisted SB has also been described that can allow direct intraoperative visualization of peripheral retina under magnification.² On the other hand, patients with giant retinal breaks (GRTs), posterior breaks, PVR worse than grade B, thin sclera, glaucoma drainage device, previous strabismus surgeries and media haze (e.g. vitreous haemorrhage) precluding visualization of peripheral retina are not ideally suited for scleral buckling procedures and respond more favourably to PPV. The main reasons for failed buckle surgery are missed breaks, fishmouth ing, inadequate buckling effect, development of new retinal breaks and PVR. The drawbacks with SB include increased postoperative morbidity like pain and periorbital oedema, drainage-related complications like vitreoretinal incarceration, subretinal haemorrhage and choroidal detachment, diplopia due to muscle restriction, chorioretinal circulatory disturbances, refractive changes (typically axial myopia), epiretinal membrane formation, buckle intrusion, extrusion and infection. Subretinal fluid may take time to absorb in case of non-drainage procedure delaying anatomical recovery and resulting in poorer final visual outcomes.

Pars plana vitrectomy

The major advantage of PPV over SB is the improved internal search for breaks with microscopic visualization of peripheral fundus by scleral indentation and internal illumination. Other major advantage usually cited is the direct elimination of vitreous traction and removal of the vitreous leading to elimination of PVR-stimulating environment.³ It can help to clear media opacity, can address very posterior breaks and giant retinal tears and allow use of PFCL, internal drainage of subretinal fluid and intraoperative retinal attachment. With the development of improved visualization systems and smaller gauge surgical techniques, the success rate of vitrectomy has improved considerably. The potential problems with vitrectomy are the increased rate of cataract formation, iatrogenic breaks, requirement for postoperative positioning and higher cost.

Table 1 summarizes the basic differences between the two techniques. Based on the above differences between SB and vitrectomy, it is obvious that a few cases like localized detachment with single or neighbouring breaks are ideal for SB and complicated cases like PVR grade C or D, giant retinal tears, very posterior breaks and macular holes are better treated with vitrectomy. However, for a vast majority of cases that lie in between these two extreme scenarios, there exists some confusion regarding which surgical modality would give the best outcome. This group comprised about 30% of all primary rhegmatogenous RDs in the SPR recruitment study.⁴ Certain ambiguous cases which include patients with multiple breaks in different quadrants, bullous rhegmatogenous RDs, breaks extending central to the equator, breaks with marked vitreous traction and rhegmatogenous RDs with unclear hole situations.
(no break or not all breaks could be identified on examination before surgery) require a lot of debate.

We searched PUBMED for the following terms: ‘retinal detachment’, ‘scleral buckle’ & ‘vitrectomy’ and finally analyzed recent relevant studies (published after year 2000) comparing SB and vitrectomy with minimum of 6 months mean follow-up and a minimum sample size of 30 eyes.

**Outcomes**

The most commonly reported anatomical outcomes in these comparative trials between SB and PPV for primary rhegmatogenous RDs include single-surgery success rate (SSSR: defined by most studies as an attached retina at final follow-up after a single surgery) and final anatomical success rate (defined as an attached retina at final follow-up after ≥1 surgical interventions). The functional outcomes studied include change in best-corrected visual acuity (BCVA, in terms of logarithm of the minimum angle of resolution [LogMAR] or Snellen’s acuity expressed as the proportion of study eyes achieving final vision better than 6/60 –6/18, depending on the study criteria). Apart from the surgical technique used, the visual acuity results may also be affected by several other factors like the presence or absence of macular detachment, height and duration of macular detachment (DMD) and amount of pre-existing cataract. The other reported outcomes were the number of retinal procedures/reoperations, the redetachment rate and complications like postoperative PVR rate, raised intraocular pressure, epiretinal membrane and cataract development (in phakic patients).

**Retrospective studies**

Table 2 summarizes the recent retrospective comparative studies between SB and PPV for rhegmatogenous RD.

Most of the retrospective studies showed no difference in anatomical and functional outcomes between SB and PPV groups (table 2). However, Park et al. have reported that PPV might show better visual outcomes compared with SB in older phakic patients, the final anatomical outcomes still remaining comparable. This may be due to the presence of PVD and performing combined cataract surgery along with PPV whenever required.

In pseudophakic eyes with uncomplicated RDs, initial and final anatomical outcomes have been reported to be better with PPV alone/PPV combined with SB compared with SB as per a meta-analysis of comparative retrospective studies.
### Table 2: SB versus PPV: retrospective studies

<table>
<thead>
<tr>
<th>Study</th>
<th>Type of surgery</th>
<th>No. of eyes (follow-up)</th>
<th>SSSR (p*)</th>
<th>Visual outcome (p*)</th>
<th>Complications (p*)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oshima et al. (2000)</td>
<td>SB</td>
<td>55 (24 months)</td>
<td>91% (final reattachment rate 100%)</td>
<td>0.42 LogMAR</td>
<td>Iatrogenic breaks 4% Subretinal/vitreous bleeding 5% Cataract progression 12% ERM formation 7% PVR 3.8% Ocular hypertension 0</td>
<td>Preoperative VA, IOP and DMD best predictors of postoperative visual recovery in both groups PPV group had better visual recovery in patients with preoperative visual acuity &lt;0.1, DMD &gt; 7 days and preoperative IOP &lt; 7 mmHg</td>
</tr>
<tr>
<td></td>
<td>PPV</td>
<td>47 (24 months)</td>
<td>91% (final reattachment rate 100%)</td>
<td>0.45 LogMAR at 24 months (p=0.85)</td>
<td>Iatrogenic breaks 4% (p=0.24) Subretinal/vitreous bleeding 2% (p=0.62) Cataract progression 64% (p&lt;0.001) ERM formation 2% (p=0.37) PVR 4% (p&gt;0.99) Ocular hypertension 2% (p&gt;0.99)</td>
<td></td>
</tr>
<tr>
<td>Miki et al. (2001)</td>
<td>SB</td>
<td>138 (6 months)</td>
<td>92% (final 100%)</td>
<td></td>
<td>Initial failure in 11 eyes due to malpositioned buckle (seven eyes multiple tears and four posterior large flap tears) Subretinal haemorrhage 4.3% Penetrating suture 2.6% Ocular motility defect 5.1% ERM 2.2% PVR 0 Postoperative cataract 0</td>
<td>Eyes undergoing PPV+encircling band achieved 100% SSSR compared with eyes treated with PPV alone (86.3%). Vitrectomy appeared to have a better success rate 96.6% in case of multiple superior breaks compared with SB (69.9%) but not statistically significant</td>
</tr>
<tr>
<td></td>
<td>PPV</td>
<td>87 (6 months)</td>
<td>92% (final 100%)</td>
<td></td>
<td>Initial anatomical failure in seven eyes (new tears five eyes, reopening of old tears in two) Subretinal haemorrhage 0 Penetrating suture 0 ERM 2.3% PVR 3.4% Lens trauma (6.9%) Iatrogenic breaks (9.2%) Postoperative cataract 20.7% (p&lt;0.05)</td>
<td></td>
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<tr>
<td>Huang et al. (2013)</td>
<td>SB</td>
<td>32 (8 weeks)</td>
<td>Mean change in LogMAR 0.4± 0.8</td>
<td></td>
<td>ERM on SDOCT in 15.6%</td>
<td>Residual SRF at macula on SDOCT in 81.3% in SB group versus 19.2% in the PPV group at 8 weeks (p&lt;0.05) PPV faster for macular recovery in macula off RDs No difference in structural changes at macula on SDOCT between two groups</td>
</tr>
<tr>
<td></td>
<td>PPV</td>
<td>26 (8 weeks)</td>
<td>Mean change in LogMAR 0.7± 0.8 (p&lt;0.05)</td>
<td></td>
<td>ERM on SDOCT in 19.2% (1.0)</td>
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<tr>
<td>Study</td>
<td>Technique</td>
<td>Duration</td>
<td>Success Rate</td>
<td>Complications</td>
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<tr>
<td>Kobashi et al. (2014)</td>
<td>PPV</td>
<td>6 months</td>
<td>96.3% (final success rate 100%)</td>
<td>Needle perforation 0.4%&lt;br&gt;Reopening of original break 2.2%&lt;br&gt;New break causing redetachment 1.1%&lt;br&gt;PVR 0.4%&lt;br&gt;Macular pucker 0.7%&lt;br&gt;CME 0.4%&lt;br&gt;Pupillary block 1.1%</td>
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<td></td>
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<tr>
<td>Erakgun et al. (2014)</td>
<td>SB</td>
<td>6 months</td>
<td>79%</td>
<td>Subretinal haemorrhage (5.2%)&lt;br&gt;Macular pucker (7.8%)&lt;br&gt;Cataract progression (13%)&lt;br&gt;Subsequent cataract sx (5.2%)&lt;br&gt;Ocular hypertension 0%&lt;br&gt;Iatrogenic breaks (10%)&lt;br&gt;Macular pucker 5% (0.6)&lt;br&gt;Cataract progression 35% (0.02)&lt;br&gt;Lens damage (5%)&lt;br&gt;PVR grade B or worse 5% (0.4)&lt;br&gt;Cataract sx 20%&lt;br&gt;Ocular hypertension 2.5%</td>
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<td></td>
</tr>
<tr>
<td>Rush et al. (2014)</td>
<td>PPV</td>
<td>6 months</td>
<td>87.6%</td>
<td>No difference in overall outcomes between different techniques.</td>
<td></td>
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</tr>
<tr>
<td>Stamenković et al. (2014)</td>
<td>PPV</td>
<td>6 months</td>
<td>76.5%</td>
<td>Better anatomical outcomes in the PPV group.</td>
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</tr>
</tbody>
</table>
Table 2:  Continued

<table>
<thead>
<tr>
<th>Study</th>
<th>Type of surgery</th>
<th>No. of eyes (follow-up)</th>
<th>SSSR (p*)</th>
<th>Visual outcome (p*)</th>
<th>Complications (p*)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Park et al. (2015)⑩</td>
<td>SB</td>
<td>72 eyes (6.9 months)</td>
<td>77.8%</td>
<td>1.38±0.87 to 0.51 ±0.48</td>
<td>Sustained submacular fluid in 38.6%</td>
<td>Final BCVA worse in the SB group (p 0.01) Primary success rate better in PPV. Final success rate 100% in both groups</td>
</tr>
<tr>
<td>Phakic uncomplicated RD, age &gt;35 years</td>
<td>PPV</td>
<td>57 eyes (6 months)</td>
<td>94.7% (p=0.01)</td>
<td>1.84±0.97 preoperatively to 0.30 ±0.23 postoperatively</td>
<td>Sustained submacular fluid in 2.8% eyes (p &lt;0.001)</td>
<td></td>
</tr>
<tr>
<td>Cankurtaran et al. (2017)⑩</td>
<td>SB</td>
<td>30 eyes (34 months)</td>
<td>73.3%</td>
<td>63.3% ≥ 2 line increase in BCVA</td>
<td></td>
<td>No difference between groups in primary or final anatomical or visual outcomes</td>
</tr>
<tr>
<td>Pseudophakic RDs</td>
<td>PPV</td>
<td>39 PPV+silicone pseudophakic RDs (32.6 months)</td>
<td>77%</td>
<td>69.2% ≥ 2 line increase in BCVA</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>32 PPV+C3F8 pseudophakic (33.7 months) RDs</td>
<td>81.2% (p 0.76)</td>
<td>87.5% ≥ 2 line increase in BCVA (p 0.6)</td>
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<td></td>
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</tbody>
</table>

* p-value for difference in parameter in the PPV versus SB group.

## Table 3: SB versus PPV: prospective studies

<table>
<thead>
<tr>
<th>Study</th>
<th>Type of surgery</th>
<th>No. of eyes (follow-up)</th>
<th>SSSR (p*)</th>
<th>Visual outcome</th>
<th>Complications (p*)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ahmadieh et al. (2005)&lt;sup&gt;17&lt;/sup&gt;, (pseudophakic and aphakic RDs)</td>
<td>SB</td>
<td>126 (6 months)</td>
<td>68.2%</td>
<td>0.96±0.68 Mean LogMar at 6 months</td>
<td>Macular pucker (22%)</td>
<td>Baseline features matched. 20G PPV, 20% SF6 tamponade in the PPV group</td>
</tr>
<tr>
<td></td>
<td>PPV</td>
<td>99 (6 months)</td>
<td>62.6%</td>
<td>0.96±0.62 Mean LogMar at 6 months</td>
<td>Macular pucker (22.2%) CME (6.1%) IOP rise early postoperative period (24.6%) EOM dysfunction 4%</td>
<td>Trauma, glaucoma, uveitis, AMD, DR, macular hole, GRT, PVR worse that grade B excluded No significant difference in anatomical and visual outcomes and complication rates Final attachment rate 85% in the SB group and 92% in the PPV group</td>
</tr>
<tr>
<td>Sharma et al. (2005)&lt;sup&gt;18&lt;/sup&gt;, Pseudophakic primary rhegmatogenous RDs</td>
<td>SB</td>
<td>25 eyes (6 months)</td>
<td>76%</td>
<td>0.19±0.15 decimal acuity</td>
<td>Intraoperative Needle perforation 4% Retinal haemorrhage 8% Early Raised IOP 4% Choroidal detachment 8% Late ERM 16% CME 4% Buckle infection 4% Diplopia 4% PVR causing failure 20%</td>
<td>Final anatomical reattachment 100% in both groups. Better long-term visual and anatomical outcomes in PPV in pseudophakic RDs</td>
</tr>
<tr>
<td></td>
<td>PPV</td>
<td>25 eyes (6 months)</td>
<td>84% (p 0.48)</td>
<td>0.28±0.12 (p 0.03) Decimal acuity</td>
<td>Intraoperative Iatrogenic breaks 24% Retinal haemorrhage 4% Early Raised IOP 32% Late ERM 12% CME 4% PVR causing failure 4%</td>
<td></td>
</tr>
<tr>
<td>Brazitikos et al. (2005)&lt;sup&gt;19&lt;/sup&gt;, RCT</td>
<td>SB</td>
<td>75 eyes (1 year)</td>
<td>83%</td>
<td>0.4 LogMAR Mean change in axial length at 1 year 0.95 mm Mean operating time 65.8 min (p=0.004)</td>
<td>Mean change in axial length at 1 year 0.95 mm Mean operating time 65.8 min (p=0.004)</td>
<td>PPV has less operative time, more accurate diagnosis of breaks and higher single-surgery reattachment rate with less postoperative axial length changes.</td>
</tr>
</tbody>
</table>

Continued
<table>
<thead>
<tr>
<th>Study</th>
<th>Type of surgery</th>
<th>No. of eyes (follow-up)</th>
<th>SSSR ($p^*$)</th>
<th>Visual outcome ($p^*$)</th>
<th>Complications ($p^*$)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary pseudophakic RRD, PVR ≤ grade B</td>
<td>PPV</td>
<td>75 eyes primary pseudophakic RRD, PVR ≤ grade B 20% SF6 for endotamponade (1 year)</td>
<td>94% ($p=0.03$)</td>
<td>0.33 LogMAR ($p=0.26$)</td>
<td>Undiagnosed breaks after surgery 7 New intraoperatively diagnosed breaks 8 Mean change in axial length at 1 year 0.33 mm ($p=0.0001$) Lower mean operating time 54.6 min ($p=0.004$) Undiagnosed breaks after surgery 0 ($p=0.01$) New intraoperatively diagnosed breaks 22 ($p=0.004$)</td>
<td>But similar final attachment rate with multiple surgeries: 96% in the SB group and 98.6% in the PPV group ($p=0.37$)</td>
</tr>
<tr>
<td>Azad et al. (2007)20, Phakic eyes uncomplicated RD</td>
<td>SB</td>
<td>31 eyes (6 months)</td>
<td>80.6%</td>
<td>From 1.48 (median) to 0.6 LogMAR</td>
<td></td>
<td>SB and PPV comparable in outcomes</td>
</tr>
<tr>
<td></td>
<td>PPV</td>
<td>30 eyes (6 months)</td>
<td>80%</td>
<td>From 1.78 (median) to 0.6 LogMAR</td>
<td>Cataract in 5 (17%)</td>
<td></td>
</tr>
<tr>
<td>Heimann et al. (2007)21, 'SPR study', RCT</td>
<td>Phakic eyes</td>
<td>SB</td>
<td>209 eyes (12 months)</td>
<td>63.6%</td>
<td>0.33</td>
<td>Cataract progression 45.8% PVR grade B or C 12.4%</td>
</tr>
<tr>
<td></td>
<td>PPV</td>
<td>207 eyes SF6 in primary Sx (12 months)</td>
<td>63.8% (0.97)</td>
<td>0.48 (0.005)</td>
<td>Cataract progression 77.3% (0.0005) PVR B or C 16.4% (0.08)</td>
<td>Silicone oil used in revision surgeries in 9.1% in the SB group and 17.9% in the PPV group Benefit of SB with respect to BCVA improvement in phakic eyes</td>
</tr>
<tr>
<td></td>
<td>Pseudophakic eyes</td>
<td>SB</td>
<td>133 eyes (12 months)</td>
<td>53.4%</td>
<td>0.46</td>
<td>PVR 22.6%</td>
</tr>
<tr>
<td></td>
<td>PPV</td>
<td>132 eyes SF6 in primary Sx (12 months)</td>
<td>72% (0.002)</td>
<td>0.38 (0.1)</td>
<td>PVR 15.2% (0.1)</td>
<td>Silicone oil used in revision surgeries in 21.8% in the SB group and 11.3% in the PPV group Better anatomical outcomes of PPV group in pseudophakic/aphakic groups</td>
</tr>
</tbody>
</table>

* $p$-value for difference in parameter in the PPV versus SB group.

### Table 4: SB versus PPV: meta-analysis studies

<table>
<thead>
<tr>
<th>Study</th>
<th>Type of surgery</th>
<th>No. of eyes (follow-up)</th>
<th>SSSR (p*)</th>
<th>Visual outcome (p*)</th>
<th>Complications (p*)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arya et al. (2006)&lt;sup&gt;14&lt;/sup&gt;, Uncomplicated pseudophakic RDs ‘Meta-analysis’</td>
<td>SB</td>
<td>1579</td>
<td>Lower initial reattachment rates</td>
<td>Lower probability of final visual improvement compared with PPV/PPV+SB OR 1.69 [95% CI 1.07–2.68]</td>
<td>Initial and final anatomical outcomes better with PPV/PPV+SB compared with SB. Final visual success highest with PPV+SB, followed by PPV alone, compared with SB. Undetected breaks, loss of capsular support and macular detachment found to be significant negative predictors of primary success rate.</td>
<td></td>
</tr>
<tr>
<td>Sun et al. (2012)&lt;sup&gt;22&lt;/sup&gt;</td>
<td>Phakic</td>
<td>SB</td>
<td>76%</td>
<td>88.6% final visual success</td>
<td>PVR 10.3% Postoperative cataract 40%</td>
<td>Final anatomical success 97.3% both groups. SB is superior in terms of final VA and occurrence of postoperative cataract in uncomplicated phakic RRDs.</td>
</tr>
<tr>
<td>Meta-analysis of RCTs</td>
<td>PPV</td>
<td>76.9% (0.8)</td>
<td>79.6% final visual success (0.005)</td>
<td>PVR 15% (0.1) Postoperative cataract 69.6% (0.00001)</td>
<td>Final anatomical success 91.1% in the SB group versus 95.5% in the PPV group (p 0.04)</td>
<td></td>
</tr>
<tr>
<td>Pseudophakic</td>
<td>SB</td>
<td>68.8%</td>
<td>86.7% final visual success</td>
<td>PVR 21.2%</td>
<td>PPV is more likely to achieve a favourable final reattachment in pseudophakic/aphakic RRDs.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PPV</td>
<td>78.2% (0.16)</td>
<td>90.5% final visual success (0.19)</td>
<td>PVR 17.8% (0.4)</td>
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</tr>
</tbody>
</table>

*P-value for difference in parameter in the PPV versus SB group.

by Arya et al. (table 4). Final visual success was highest when PPV was combined with SB, followed by PPV alone, compared with SB. Undetected breaks, loss of capsular support and macular detachment found to be significant negative predictors of primary success rate in these pseudophakic RDs.

Even in eyes with mild vitreous haemorrhage (where peripheral fundus can be adequately visualized), Erakgun et al. found that though the initial visual outcome was better in the PPV group, the final visual and anatomical outcomes (at 6 months) were comparable in both groups.

Various retrospective studies have also compared PPV alone and PPV with additional SB. Anatomical and functional success rates were better with the use of a scleral explant during PPV for uncomplicated forms of phakic rhegmatogenous RDs with inferior breaks. However, they seem to have similar efficacy in the repair of a matched group of patients with primary non-complex pseudophakic RD.

Common complications in SB according to most studies were subretinal haemorrhage due to perforation, epiretinal membrane formation and delayed absorption of submacular fluid (in non-drainage procedures). In the PPV group, the incidence of cataract progression and lens damage, occurrence of iatrogenic breaks was significantly more common when compared with the SB procedure.

Retrospective studies suffer from the fact there may be severe selection bias as the decision to opt for a particular surgery is influenced by various other factors like preoperative findings, patient characteristics, available tools for surgery, and experience, ability and preference of the operating surgeon.

Prospective studies
There are relatively limited number of prospective studies that compare outcomes of SB and PPV (Table 3).

In phakic eyes, most prospective studies have found better visual outcomes with SB when compared with PPV for uncomplicated RDs, although the final anatomical outcomes may be similar in both groups. This can be explained by the higher incidence of cataract progression and difficulty in adequate vitreous base excision during vitrectomy.

In pseudophakic eyes on the other hand, PPV is more likely to achieve a favourable anatomical outcome, though there was not much difference in final visual outcomes. The main issue in pseudophakic/aphakic eyes is the difficulty in pre-operative visualization as the breaks are usually small and multiple, anterior and posterior capsular haze, cortical remnants, suboptimal dilatation and optical aberrations due to the IOL. Most studies have attributed the lower anatomical success in the SB group to missed small breaks possibly due to poor visualization of periphery. SB has also been shown to be associated with a significant increase in axial length postoperatively compared with PPV.

The SPR study
The Scleral Buckling versus Primary Vitrectomy in Rhegmatogenous Retinal Detachment Study (SPR Study) was the first large-scale, open-label prospective randomized multicentre clinical trial which compared SB surgery and primary PPV in rhegmatogenous retinal detachments of medium complexity with 1-year follow-up. It separated phakic and pseudophakic patients (parallel group design). Forty-five surgeons who had to have performed atleast 100 SB procedures and 100 PPVs as primary surgeons from 25 centres in five European countries recruited 416 phakic and 265 pseudophakic patients. In the phakic arm, the mean BCVA change was significantly (p=0.0005) greater in the SB group (SB, $-0.71\logMAR$, standard deviation [SD] 0.68; PPV, $-0.56\logMAR$, SD 0.76). In the pseudophakic arm, changes in BCVA showed a non-significant difference of 0.09 logMAR. In phakic patients, cataract progression was greater in the PPV group (p<0.00005). In the pseudophakic group, the primary anatomical success rate (SB, 71/133 [53.4%]; PPV, 95/132 [72.0%]) was significantly better (p=0.0020), and the mean number of retina-affecting secondary surgeries (SB, 0.77, SD 1.08; PPV, 0.43, SD 0.85) was lower (p=0.0032) in the PPV group. Re-detachment rates were 26.3% (SB, 55/209) and 25.1% (PPV, 52/207) in the phakic trial and 39.8% (SB, 53/133) and 20.4% (PPV, 27/132) in the pseudophakic trial. The study showed a benefit of SB in phakic eyes with respect to BCVA improvement. No difference in BCVA was demonstrated in the pseudophakic trial; based on a better anatomical outcome, PPV was recommended in these patients.

Meta-analysis
Table 4 summarizes the results of two large meta-analyses of studies comparing SB with PPV.

The results of different studies cannot be compared together as the surgical techniques may be different, for example combining cataract surgery with vitrectomy in phakic patients might improve the visual acuity results, use of additional SB/encirclage, use of 360° endolaser and the use of gas or oil for tamponade in vitrectomy may change the rate of re-detachment and anatomical prognosis. The decision to drain or not in SB may also affect the complication rates and final outcomes.

It is also important to note that most prospective and retrospective studies comparing PPV with SB have employed gas as primary tamponade
(SF6/C3F8) for PPV. Silicone oil was used only in cases of recurrent detachments. In clinical practice, it is not uncommon to use silicone oil as the primary tamponading agent during PPV for rhegmatogenous RDs. Silicone oil and its associated complications can also have an impact on final visual and anatomical outcomes of PPV.

Furthermore, most of these studies have used traditional 20G systems for PPV. In the current scenario, small gauge vitrectomy and microincision vitrectomy systems (MIVS) have become the norm, with improved outcomes and reduced complication profiles which should be taken into consideration during these comparisons.

Conclusions
The controversy still continues and debate can go on regarding the efficacy of both these surgical procedures as a primary form of repair for RD. Many retrospective and prospective studies have shown nearly equal SSRs, anatomical success rates and functional outcomes in SB as well as PPV. In general, SB remains the method of choice in uncomplicated retinal situations, i.e., single breaks and/or a limited RD. In contrast, PPV is indicated in complicated situations. However, the decision to choose one particular type of surgery has to be individualized to that particular case scenario. It would also depend on the surgeon’s preference and comfort with a particular technique. SB, although an old technique still holds good and can give excellent results if performed well. It would be advisable for the young retina surgeons to acquire this skill set.

References