Refractive lens exchange in high myopia: long term follow up

N Horgan, P I Condon, S Beatty

The aim of this follow up study was to establish the long term visual outcomes and incidence of complications following refractive lens exchange (RLE) performed for the correction of high myopia.

PATIENTS AND METHODS

Patients who underwent RLE between January 1990 and December 2001 were identified from the operative log books of a single surgeon (PIC), and were invited to attend a special clinic set up for the purpose of this study.

Refractive lens exchange had been performed in preference to corneal refractive surgery for the correction of myopia in patients who (a) had peripheral lens opacities despite a clear central crystalline lens, and/or (b) where the degree of myopia exceeded that which could safely be corrected by laser in situ keratomileusis (LASIK) or photorefractive keratectomy (PRK). Many of the patient group were already aphakic if target postoperative refraction would be achieved by an IOL of lower power than available from IOL manufacturers. Standard practice at that time was to leave the eye aphakic if target postoperative refraction would be achieved by an IOL of lower power than available from IOL manufacturers.

A posterior chamber IOL was implanted in 46 of the 62 study eyes (74.2%). No IOL was inserted in the remaining 16 eyes and these were, therefore, rendered aphakic. These cases represent those performed earliest in the series, before the ready availability of low powered, plano or minus powered IOLs. Standard practice at that time was to leave the eye aphakic if target postoperative refraction would be achieved by an IOL of lower power than available from IOL manufacturers.

Abbreviations: CLE, clear lens extraction; IOL, intraocular lens; LASIK, laser in situ keratomileusis; MMD, myopic macular degenerative changes; PRK, photorefractive keratectomy; RLE, refractive lens exchange; UVA, unaided visual acuities
Of note, YAG capsulotomy had not been performed in either degeneration had been performed in this eye before surgery. 27.80 mm. Interestingly, prophylactic laser to areas of lattice RLE, with “in the bag” IOL placement, for correction of the other case, the retina detached 5 months after uneventful insertion, in an amblyopic eye with a refractive error of 78 months following RLE.

Peripheral retinal degenerative changes were seen in 30 eyes (48.4%), lattice degeneration in 14 eyes (22.6%), and combined paving stone and lattice degeneration in three eyes (4.8%).

Two cases of rhegmatogenous retinal detachment occurred in the postoperative period. One case occurred 2 months following uncomplicated RLE, with “in the bag” IOL insertion, in an amblyopic eye with a refractive error of −8.50 dioptres and peripheral paving stone degeneration. In the other case, the retina detached 5 months after uneventful RLE, with “in the bag” IOL placement, for correction of −10.25 dioptres of myopia in an eye of axial length 27.80 mm. Interestingly, prophylactic laser to areas of lattice degeneration had been performed in this eye before surgery. Of note, YAG capsulotomy had not been performed in either eyes that had a retinal detachment. None of the 16 aphakic eyes developed a retinal break or detachment.

**DISCUSSION**

This study provides follow up data on 62 cases of RLE performed over a 10 year period by a single surgeon. In order to ensure the quality of our findings, we report only those patients who returned for a thorough ophthalmic examination, with particular attention to retinal and vitreous findings.

Previous studies have reported incidences of retinal detachment following RLE ranging between 0% and 8.1% (table 1), comparable with the 3.2% incidence in our study. Interestingly, both cases in this series occurred within 6 months of uncomplicated RLE with “in the bag” IOL insertion, and neither eye had undergone YAG capsulotomy. The published series of RLE have insufficient power to draw firm conclusions regarding the benefits of prophylactic retinal laser in eyes scheduled for RLE, or the putative additional risk following YAG capsulotomy in these eyes. There is a consensus, however, that laser capsulotomy in highly myopic eyes increases the incidence of posterior vitreous detachment, thereby potentially precipitating a retinal detachment. Interestingly, in this patient series, the rate of YAG capsulotomy was 61% over the follow up period. Although high by current standards, it should be remembered that many of the cases included underwent RLE with IOL insertion before the availability of square edged IOLs and were of younger age than the average phacoemulsification patient.

Estimates of retinal detachment risk in the unoperated highly myopic population vary from 0.4% to 0.68% per person year. In this group of 37 patients over a mean follow up of 64 months, this would translate into an expected occurrence of between 0.79 and 1.34 cases of retinal detachment in this time interval. The observed occurrence was of two retinal detachment cases, however.

Refractive lens exchange is an effective form of refractive surgery, which may be considered in patients with high myopia in whom excimer laser is inappropriate. For example, older patients in whom loss of accommodation is not a concern, or in whom early peripheral lens opacities are present, are often good candidates for RLE. This procedure employs phacoemulsification techniques familiar to the cataract surgeon, and recent developments, including smaller incision sizes, foldable IOLs, and improved intraoperative anterior chamber stability, are leading to increasingly refined surgery with less disturbance to the anatomical and physiological homeostasis within the eye. Furthermore, the predictability of target postoperative refraction continues to improve, with laser interferometry axial length technology.

**Table 1 Published incidences of retinal detachment following clear lens extraction**

<table>
<thead>
<tr>
<th>Author</th>
<th>Prospective/ retrospective</th>
<th>No of cases</th>
<th>Average follow up (months)</th>
<th>Range of follow up</th>
<th>Incidence of retinal detachment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colin</td>
<td>Prospective</td>
<td>52</td>
<td>12</td>
<td>NA</td>
<td>0%</td>
</tr>
<tr>
<td>Colin</td>
<td>Prospective</td>
<td>52</td>
<td>48</td>
<td>NA</td>
<td>1.9%</td>
</tr>
<tr>
<td>Colin</td>
<td>Prospective</td>
<td>52</td>
<td>84</td>
<td>3 months</td>
<td>8.1%</td>
</tr>
<tr>
<td>Barraque</td>
<td>Retrospective</td>
<td>165</td>
<td>31</td>
<td>minimum</td>
<td>7.3%</td>
</tr>
<tr>
<td>Gris</td>
<td>Retrospective</td>
<td>46</td>
<td>7</td>
<td>6-15 months</td>
<td>2.17%</td>
</tr>
<tr>
<td>Pucci</td>
<td>Retrospective</td>
<td>25</td>
<td>42.9</td>
<td>39-49 months</td>
<td>4%</td>
</tr>
<tr>
<td>Lee</td>
<td>Retrospective</td>
<td>24</td>
<td>15</td>
<td>7</td>
<td>0%</td>
</tr>
<tr>
<td>Fernandez-Vega</td>
<td>Retrospective</td>
<td>190</td>
<td>57.6</td>
<td>37-96 months</td>
<td>2.1%</td>
</tr>
</tbody>
</table>

NA, not applicable.
and third and fourth generation biometric formulas, enhancing accuracy in longer eyes.

Nevertheless, RLE is an intraocular procedure with real sight threatening risks including acute intraoperative suprachoroidal haemorrhage, retinal detachment, and endophthalmitis. The low incidence of these complications in cataract surgery\(^1\) does not diminish the visual consequences, should they occur.

**CONCLUSION**

Refractive lens exchange by modern small incision phacoemulsification is an effective means of correcting high myopia. RLE is particularly suitable for patients with high myopia who are presbyopic, or who are approaching presbyopia, especially in the presence of peripheral crystalline lens opacification.

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