Combining phacoemulsification with vitrectomy for treatment of macular holes

J M Lahey, R R Francis, D S Fong, J J Kearney, S Tanaka

Aim: To describe the results of combined phacoemulsification, insertion of posterior chamber intraocular lens (PCIOL), and pars plana vitrectomy for patients with macular hole.

Methods: A case series of 89 consecutive patients with macular hole who underwent combined phacoemulsification, insertion of PCIOL, posterior capsulotomy, and pars plana vitrectomy.

Results: 80 of 89 patients (89%) had their holes closed with the combined surgery. Four of the nine patients who failed had their holes closed with one further procedure. Of the 89 patients operated on, 61 (67%) had vision of 20/40 or better. Three patients (3%) had Snellen acuity of less than 20/400 postoperatively. Three patients (3%) had early visual improvements.
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There were no instances of significantly subluxated or dislocated intraocular lenses. In nine patients, the PCiol was placed in the ciliary sulcus. It is our practice to place a sulcus lens whenever there is a question about posterior capsule integrity. No problems with IOL cornea touch occurred in any of the patients during or after surgery. There were no postoperative problems related to corneal oedema. No patients were brought back to the operating room for wound leaks.

Eight patients had mild segmental synechiae of the iris to the anterior capsulorhexis. One patient who had sickle cell disease had a significant iris and developed iris bombe, which resolved after YAG peripheral iridectomies and topical steroids.

One patient developed an epiretinal membrane without reopening of the macular hole. This patient underwent repeat vitrectomy with epiretinal membrane peeling.

**DISCUSSION**

Vitrectomy surgery alone is only the first step in visual rehabilitation of the phakic patient with a macular hole. Following vitrectomy surgery, cataract may develop in older patients and may lead to reduction in visual gain from macular hole closure. If patients often require multiple changes to their spectacle correction and, later, require cataract surgery. Of 56 patients in Thompson's series, 96% (54 eyes) developed progressive nuclear sclerosis during follow up. In Leonard's series, nuclear sclerotic cataracts progressed in 75% of eyes by one year and 95% of eyes followed for 2 years. Of the 81 phakic eyes, 80% required CE/IOL 5–36 months after macular hole surgery. The current study suggests that vitrectomy surgery should be combined with cataract surgery to minimise patient morbidity and to speed up visual recovery.

In addition to faster visual recovery, potential benefits include the ability to remove the anterior vitreous; removal of the anterior vitreous can be performed without risking lens injury during vitrectomy. The scleral depression also allows visualisation and detection of small tears in the anterior retina. This more complete vitrectomy allows for a better gas fill. The increased gas fill may provide longer tamponade, which will increase the closure rate.

Although concerns about combining macular hole surgery with cataract surgery have been raised, numerous studies have reported the safety and efficacy of combining phacoemulsification with vitrectomy surgery. The current study confirms earlier reports that combining vitreous surgery with cataract surgery for macular hole is safe. Because early opacification of the posterior capsule after combined surgery for macular hole is common (personal experience), we have added a posterior capsulectomy to the combined approach to prevent posterior capsule opacification, a common cause of late visual loss after cataract surgery. There was no increase in the number of retinal detachments compared to other studies in which vitrectomy alone was performed to repair macular holes. Only three patients (3%) in our series developed retinal detachments. There were no significant IOL complications.

One previous report in a series of seven cases of combined surgery for macular hole found a 43% incidence of clinical and angiographic cystoid macular oedema after combined surgery. We were particularly careful to find patients who developed cystoid macular oedema after the combined surgery. Only eight patients (9%) in our study had clinically significant cystoid macular oedema after surgery. All cases had improvement of vision and resolution of oedema with topical and posterior sub-Tenon's steroids and time.

Increased inflammation did occur in our series. Eight patients (9%) in our series had small, segmental synechiae of the iris to the anterior capsule. Although there is an increase in inflammation because of combined surgery, topical steroids appear to be effective in bringing it under good control soon after the surgery.

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**Table 1** Description of study population

<table>
<thead>
<tr>
<th>Macular hole stage</th>
<th>% (No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>III</td>
<td>91 (81)</td>
</tr>
<tr>
<td>IV</td>
<td>9 (8)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Preoperative lens nuclear sclerosis*</th>
<th>% (No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1+</td>
<td>75 (67)</td>
</tr>
<tr>
<td>2+</td>
<td>25 (22)</td>
</tr>
</tbody>
</table>

*Nuclear sclerosis was graded at the slit lamp and defined as follows: Grade 0 was a clear lens, grade 1 early nuclear sclerosis with mild yellow colour of the posterior lens in the slit beam, grade 2 yellow colour change throughout the lens, grade 3 yellow brown coloration throughout the lens, and grade 4 a brown coloured lens.

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**Table 2** Distribution of visual acuity

<table>
<thead>
<tr>
<th>Preoperative visual acuity</th>
<th>Final visual acuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>% (No)</td>
<td>% (No)</td>
</tr>
<tr>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td>20/40</td>
<td>65 (58)</td>
</tr>
<tr>
<td>&lt;20/40 to ≥20/200</td>
<td>32 (29)</td>
</tr>
<tr>
<td>&lt;20/200</td>
<td>3 (2)</td>
</tr>
</tbody>
</table>

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Table 2 describes the visual acuity outcomes. At the final visit, 65% (58 of 89 eyes) had postoperative visual acuity of 20/40 or better. Table 3 lists the postoperative complications. Three of 89 (3.3%) patients had retinal detachments. One of these occurred as a result of a mild posterior staphyloma in a highly myopic patient who had a significant amount of subretinal fluid surrounding the hole preoperatively. One patient developed proliferative vitreoretinopathy (PVR) and required silicone oil, but in all cases the retina was reattached. Retinal tears were found and treated in 13 (14.6%) patients, of which 10 had >2 dioptres of myopia.

Cystoid macular oedema developed in 9% (eight eyes). In one of these cases it was probably due to latanoprost use which resolved after YAG peripheral iridectomies and topical steroids.

DISCUSSION

Vitrectomy surgery alone is only the first step in visual rehabilitation of the phakic patient with a macular hole. Following vitrectomy surgery, cataract may develop in older patients and may lead to reduction in visual gain from macular hole closure. Patients often require multiple changes to their spectacle correction and, later, require cataract surgery. Of 56 patients in Thompson's series, 96% (54 eyes) developed progressive nuclear sclerosis during follow up. In Leonard's series, nuclear sclerotic cataracts progressed in 75% of eyes by one year and 95% of eyes followed for 2 years. Of the 81 phakic eyes, 80% required CE/IOL 5–36 months after macular hole surgery. The current study suggests that vitrectomy surgery should be combined with cataract surgery to minimise patient morbidity and to speed up visual recovery.

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Combining phacoemulsification, insertion of PCIOL, posterior capsulotomy and pars plana vitrectomy repair can be used to treat macular holes. Combined surgery appears to be safe and may prevent common postoperative visual loss from progressive cataract formation.

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REFERENCES
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