

# Functional outcome and patient preferences following combined phaco-vitreectomy for macular hole without prone posturing

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## Abstract

**Background** Macular hole surgery varies widely regarding the duration of gas tamponade, the use of patient posturing post-operatively, and whether or not cataract extraction is undertaken at the same time.

**Aim** To analyse anatomical and functional success rate following macular hole surgery and to examine patient preferences regarding posturing and length of gas tamponade.

**Materials and methods** Study design. Prospective, interventional and non-comparative case series.

**Participants.** Thirty patients with stage III and IV full-thickness macular hole who underwent macular hole repair during the period April 2005–January 2006.

**Intervention.** All eyes underwent a standard three-port pars plana vitrectomy, removal of posterior vitreous, internal limiting membrane (ILM) peel, C3F8 gas tamponade, and cataract extraction with IOL implantation. Patients did not posture post-operatively.

**Outcome measures.** Post-operative anatomic results, visual acuity, complications, patient preferences regarding surgical protocol, and subjective improvement in visual function.

**Results** Patients were followed up post-operatively for 6 months. Primary anatomical hole closure was achieved in 96.7% eyes. Visual acuity improved in 83.8% patients. Two patients had raised intraocular pressure following surgery. A total of 96.9% of patients were happy with no posturing and a 2-month gas bubble.

**Conclusions** There is a high rate of anatomical and functional success in patients undergoing macular hole surgery without prone posturing. In our study, most patients preferred long-acting gas tamponade with no posturing over the option of posturing with short-acting gas tamponade.

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**Keywords:** macular hole; phaco-vitreectomy; posturing; patient preference

## Introduction

Idiopathic full-thickness macular hole has an incidence of approximately 1 per 1000 population causing variable reduction of vision.<sup>1</sup> Kelly and Wendel<sup>2</sup> performed the first successful vitrectomy for macular hole in 1991 and since then, both anatomical and functional success rates have continued to improve. Modifications to the original procedure include the use of different tamponade agents such as gas or silicone oil, use of adjuncts such as autologous serum and fibrin, transforming growth factor beta, platelets, thrombin, and peeling of the internal limiting membrane (ILM).<sup>2–5</sup> Hole duration, stage, preoperative visual acuity, type of tamponade, or whether or not the ILM is peeled may be important predictors of success rate in macular hole surgery.<sup>5</sup> Today, practice differs widely in relation to whether or not ILM peeling is routinely undertaken as part of the procedure, the duration of gas tamponade, the use of and

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duration of patient positioning post-operatively, and whether or not cataract extraction is undertaken at the same time.

**Aim of the study**

The aim of the study was to analyse anatomical and functional success rate following macular hole surgery combined with cataract surgery, but with no post-operative posturing, and to examine patient preferences regarding posturing and length of gas tamponade.

**Method**

The study consisted of a non-randomized, consecutive series of patients with idiopathic macular holes seen between April 2005 and January 2006. A total of 30 patients with macular hole were included in the study. Preoperative data collected included age, gender, best-corrected visual acuity (BCVA), refraction, lens status, duration and stage of macular hole, and the presence of posterior vitreous detachment (PVD) and any other associated retinal comorbidity. All patients underwent a thorough slit-lamp examination, dilated fundus examination, and an optical coherence tomographic assessment of the macula.

**Procedure**

After informed consent, all eyes underwent phacoemulsification with implantation of intraocular lens, followed by vitrectomy. PVD was induced where necessary, using active aspiration via the vitreous cutter over the optic disc. Once vitreous gel was cleared, ILM peeling was assisted with membrane blue visualisation. Peeling was completed in a rhexis fashion for approximately 1.5 disc diameters centred on the fovea. The periphery of the retina was examined for retinal breaks using scleral indentation, and any retinal breaks were treated with cryotherapy or argon laser photocoagulation. Fluid-air exchange was performed and the air was replaced with 16% C3F8 gas. At the end of surgery, all patients received subconjunctival and topical antibiotics and steroids. Patients were seen at 1 day, 2 weeks, 2 months, and 6 months. Post-operatively, patients underwent visual acuity testing, measurement of intraocular pressure (IOP), and fundoscopy to assess the degree of gas fill and retinal integrity. Patients were not instructed to posture prone provided there was at least a 70% gas fill in the vitreous cavity on day 1 post-operative. All patients were however instructed to avoid lying supine. Anatomic success was defined as closure of the hole. Functional success was defined as an objective improvement in visual acuity. All patients were asked to fill in a patient satisfaction questionnaire at the end of

2 months. Data were analysed using an Excel spreadsheet and Snellen visual acuity was converted to the logarithm of the minimal angle of resolution (logMAR).

**Results**

*Patient demographics*

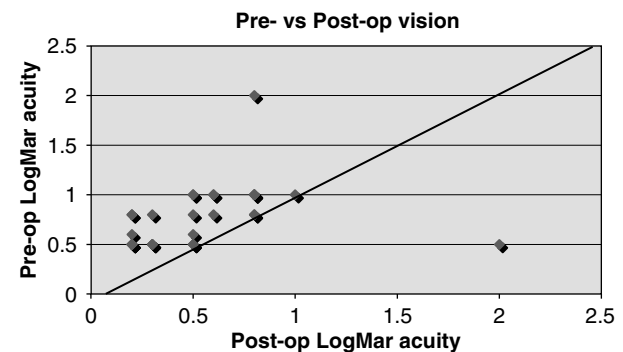
Thirty-one eyes of 30 (20 female, 10 male) consecutive Caucasian patients presenting with idiopathic, full-thickness macular hole were recruited in the study over a period of 10 months. The age of the patients ranged from 58 to 85 years with a mean age of  $72.42 \pm 7.40$  (mean  $\pm$  SD). Average hole duration was 6.04 months; 64.5% holes were Stage III, 19.3% were stage II, and 16.1% were stage IV according to the staging criteria proposed by Gass.<sup>6</sup> All patients were considered to have early to moderate cataract formation before surgery.

*Anatomical outcome*

After a mean followup period of 6 months, primary successful macular hole closure was achieved in 96.7% (30/31) eyes. In one patient, the hole reopened after primary closure. Hole closure was achieved with repeat fluid gas exchange and facedown posturing for 10 days. Post-operatively, two patients had raised IOP that responded to medical treatment with a prostaglandin analogue. Peripheral retinal breaks were found in five eyes. These were treated with cryotherapy. There were no cases of endophthalmitis or retinal detachment in the current series.

*Functional outcome*

Post operatively, BCVA ranged from 20/200 to 20/30 (mean 20/63). Visual acuity improved by an average of two lines in 26 (83.8%) eyes (Figure 1). In these eyes,



**Figure 1** Chart demonstrating change in visual acuity from preoperative levels. (Snellen acuities have been converted to their logMAR equivalents).

the BCVA ranged from 20/125 to 20/30 mean 20/60. In four (12.9%) patients, the vision remained the same and worsened in one (3.2%) eye. This was attributed to RPE atrophy.

### *Patient satisfaction survey*

Patients were asked retrospectively via questionnaire if they were satisfied with their surgical protocol, or whether they would have preferred short-acting gas tamponade with at least 1 week face down posturing and cataract surgery at a later date. Twenty-nine (96.9%) of the 30 patients preferred the protocol they received.

Five (16.6%) of our patients reported difficulties relating to the gas tamponade. These included difficulty judging distances and feeling nauseous or unwell.

Twenty-seven (90%) patients were extremely satisfied with the surgery and the aftercare that they received and were willing to undergo the procedure again.

### **Discussion**

Studies of macular hole surgery are currently reporting anatomical success rates in excess of 90%. There are several prognostic indicators for anatomical and functional success following surgery. These include stage of the hole, hole duration, hole size, preoperative visual acuity, and whether or not peeling of the ILM is performed.<sup>7-10</sup> Various studies have confirmed that shorter hole duration and lower stage of macular hole, together with ILM peeling at the time of surgery are associated with a higher anatomical closure rate.<sup>8,9</sup> However, the role of posturing in macular hole surgery remains controversial. A study designed to objectively evaluate the time of post-operative posturing by patients undergoing macular hole surgery questioned the importance of posturing in determining the success of macular hole surgery.<sup>11</sup> Face down posturing is inconvenient, difficult, and unpopular, especially in the elderly. There have been reports of ulnar nerve palsies attributed to prolonged posturing.<sup>12</sup> The current study confirms the high anatomical success rate of macular hole surgery. Our closure rate of 96.7% with an average hole duration of 6 months compares with other series reported in the literature. Jaycock *et al*<sup>8</sup> have reported a closure rate of 95.2% for macular holes of less than 6 months duration and 91.7% for those where hole duration is between 6 and 12 months.

Our patient satisfaction survey underlined the fact that patients preferred to have long-acting gas tamponade rather than short-acting tamponade combined with posturing. However, it is important to note that patients were asked retrospectively to compare the treatment they

received with a hypothetical situation and results of such a survey are likely to be biased.

Macular hole formation is more common in the elderly who may have other systemic problems affecting the ability to posture or compliance with the instructions. The 'Maculog' device designed by Verma *et al*<sup>11</sup> to objectively measure posturing time showed that many patients were actually posturing less than half of the time they thought they were posturing. Based on these preliminary observations, they questioned the importance of posturing in determining the success of macular hole surgery. The current series found no adverse effects of not posturing, in terms of anatomical and functional outcome.

Visual acuity improved by an average of two lines in 83.8% of our patients with a mean visual acuity of 20/60. In a series published by Tranos *et al*,<sup>1</sup> only 50% of patients improved by two lines and 27% had a visual acuity of 20/40 or better. All the patients had C3F8 gas tamponade and were asked to posture face down for 1 week.

Nuclear sclerosis is one of the most common complications after macular hole surgery. This has been attributed to damage to the lens, harmful effects of intraocular irrigating solutions, and removal of the vitreous.<sup>13</sup> Pre-existing lens opacities may impair visualisation of the ILM, thus hindering attempts to peel during surgery.<sup>14</sup> Thus, the phacovitrectomy performed for the phakic patients in our series is cost effective and removes the need for subsequent surgery, allowing more rapid visual rehabilitation. Also phacoemulsification may be technically more challenging in a vitrectomised eye with a higher incidence of complications. Lack of vitreous support and previous damage to the posterior capsule and the zonular fibres have been suggested as increasing complication rates in vitrectomised eyes.<sup>8</sup> The patient preference survey also indicated that patients were happy to undergo simultaneous cataract surgery, even with only early cataract formation, rather than undergo a second operation at a later date. Other authors have also advocated the use of phacovitrectomy without prone posturing for full-thickness macular holes.<sup>15</sup> In our study, there were no significant complications associated with the surgery. Several patients had transient rises in IOP, which responded well to conservative treatment.

In addition to investigating the success rate of combined phacovitrectomy with ILM peel for macular holes, without the use of post-operative posturing, we also examined patient preferences regarding the surgical protocol. However, the study has its limitations. Patients were questioned regarding preference of surgical protocol retrospectively. This obviously induces potential bias to the responses. The technique outlined in this paper is the standard approach adopted by the surgeon (MC). Short-acting tamponade with prone posturing is

offered to the patient if there are other patient factors involved, such as poor vision in the fellow eye, or difficulties with mobility, etc.

### Conclusions

Patients in our study obtained a satisfactory anatomical and functional success rate after combined surgery without the use of prone posturing. There was no apparent adverse effect on anatomical or functional outcomes with this approach, when compared with reported success rates after posturing. Patients preferred the surgical protocol that involved phacovitrectomy and no posturing over the option to posture with shorter-acting gas tamponade. A randomised controlled trial of posturing *vs* no posturing would be needed to better elucidate possible differences in outcomes for postured patients *vs* non-postured.

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