

# Cataract extraction after retinal detachment repair by vitrectomy : visual outcome and complications

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## Abstract

**Aims** To determine the intraoperative and postoperative complications and visual outcome of eyes undergoing cataract extraction after previous retinal detachment repair by pars plana vitrectomy (PPV).

**Methods** Retrospective analysis of 72 patients who had cataract extraction by phacoemulsification having had retinal detachment repair by vitrectomy and internal tamponade.

**Results** Best-corrected visual acuity (BCVA) had improved in 53 (74%) of eyes at 3 weeks after cataract surgery and 65 (90%) at final follow-up. Fifty-three eyes (74%) attained 6/12 visual acuity at final follow-up compared with 19 (26%) eyes with a preoperative vision better than 6/12. There was a significant improvement in BCVA after cataract extraction ( $P < 0.001$ ). Poor vision was usually related to retinal comorbidity.

Intraoperative events occurred in nine eyes (12.5%) including capsulorrhexis tears, zonular dehiscence and vitreous loss. Postoperative events occurred in 15 eyes (20.8%). Retinal re-detachment occurred in four eyes (5.6%).

**Conclusions** Cataract extraction after retinal detachment surgery by vitrectomy generally results in a significant visual improvement, however, there is an increased intraoperative and postoperative complication rate. The risk of retinal re-detachment may previously have been underestimated.

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**Keywords:** cataract surgery; complications; retinal detachment

## Introduction

Cataract surgery is known to carry a risk of subsequent retinal detachment which is

estimated to be between 0.1 and 0.81%.<sup>1–7</sup> The risk for recurrent retinal detachment after cataract surgery in eyes that have previously undergone retinal detachment repair is, however, less well documented. Reports of series of eyes that have undergone previous scleral buckling surgery generally document good visual outcomes after cataract surgery, with a low rate of intraoperative complications and recurrent retinal detachment (0–3.4%).<sup>1,8–13</sup> More recently, the results of cataract extraction by phacoemulsification after vitrectomy surgery have reported recurrent retinal detachment rates between 0 and 5.8%.<sup>1,14–20</sup>

Cataract formation occurs in up to 80% of eyes after pars plana vitrectomy (PPV) within 2 years and cataract surgery in the vitrectomised eye presents special challenges, which potentially have higher rates of intraoperative complications.<sup>1,14–20</sup> This study was undertaken to determine the visual outcome and complication profile of eyes undergoing cataract surgery after previous retinal detachment repair by PPV.

## Materials and methods

The records of all eyes that had cataract extraction after previous PPV for primary repair of retinal detachment at Moorfields Eye Hospital between 1 December 2002 and 31 September 2003 were reviewed. Eyes were excluded if they were undergoing additional vitreoretinal procedures (including removal of silicone oil) at the time of cataract surgery.

Data collected included patient's demographics, preoperative, and postoperative best-corrected visual acuity (BCVA), intraoperative and postoperative complications. Preoperative and postoperative BCVA were recorded at 3 weeks ( $n = 72$ ), 6 months ( $n = 59$ ),

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and final visit ( $n = 72$ ). BCVA was converted to the logarithm of minimum angle of resolution (logMAR) scale for statistical analysis.

In patients who had had bilateral retinal detachments and cataract extractions, one eye was randomly chosen to be in the study and the fellow eye was excluded. Cataract surgery was planned to be undertaken as routine phacoemulsification under topical, peribulbar, subTenon, or general anaesthesia. An acrylic or silicone lens was inserted into the capsular bag. A corneal suture was used if required to seal the corneal wound at the end of the surgery.

## Results

The case notes of 74 patients who had undergone cataract extraction after retinal detachment surgery by vitrectomy were identified. In total, 84 notes were obtained and 10 notes were excluded due to additional vitreoretinal procedures at the time of cataract surgery. Patients who had no follow-up recorded after cataract surgery were excluded ( $n = 2$ ) and therefore, 72 patients were included in the analysis (32 male and 40 female). Thirty-five notes, which had previous PPV for many different retinal procedures, were not obtained and it could not be clarified as to what percentage of these eyes had previous retinal detachment and could potentially be included in the study. This information was only available if the notes were obtained.

All eyes had retinal detachment with posterior vitreous detachment attributed to horseshoe tears (HST) in 52 eyes (72%), atrophic holes in 10 eyes (14%), atrophic holes and HST in 8 eyes (11%), and giant retinal tears in 2 eyes (3%). The macula was attached in 27 eyes (37.5%). Before retinal detachment surgery 55 patients (76%) had no evidence of cataract recorded. Retinal detachment was repaired with silicone oil in six patients and with intraocular gas tamponade in the remaining 66 patients.

At the time of cataract extraction the type of cataract was recorded as nuclear sclerosis in 58 (76%), posterior subcapsular in 11 (15%), cortical in 3 (4%), and posterior polar in 1 (1%). There was a mean axial length (AXL) of  $25.4 \pm 1.98$  mm and 26 eyes (36%) had an axial length greater than 26 mm.

The median time interval between retinal detachment repair and cataract surgery was 19.2 months and 49 patients (68%) had had cataract surgery 2 years after retinal detachment surgery. The age of patients at cataract surgery ranged from 25 to 84 years with a mean of  $62.9 \pm 11.4$  years.

Phacoemulsification was planned in all cases. One patient had unplanned extracapsular extraction that was subsequently converted to a lensectomy and vitrectomy when the lens displaced to the vitreous cavity. The lens was placed in the capsular bag in 70 eyes, in the sulcus in 1 eye, and 1 eye was left aphakic.

**Table 1** Perioperative complications ( $n = 72$ )

Complication	Frequency
Zonular dehiscence	3
Anterior rhexis tear	3
Vitreous loss/anterior vitrectomy/ dropped lens	2
Hyphaema	1
Total	9 (12.5% of total $n = 72$ )

**Table 2** Postoperative complications ( $n = 72$ )

Complication	Frequency
Wound problem	2
Retained lens matter	3
Decentration of IOL	2
Cystoid macula oedema	1
Uveitis	4
High intraocular pressure	2
Atrophic retinal hole	1
Total	15 (20.8% of total $n = 72$ )

IOL = intraocular lens.

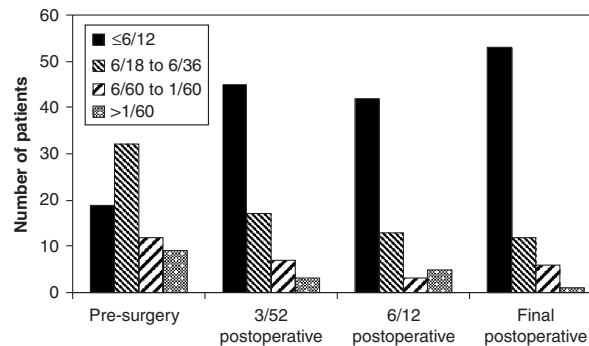
Perioperative complications occurred in nine cases (12.5%) and are shown in Table 1. Postoperative complications occurred in 15 eyes (20.8%), which is shown in Table 2. Two patients had further surgery to resuture leaking corneal wounds. One patient was noted to have an atrophic retinal hole post-cataract surgery, which was lasered with no sequelae. The other postoperative complications settled down with medical management and required no surgical interventions. Posterior capsular opacity (PCO) occurred in 18 (25%) patients in the follow-up period, 6 of these were noted to have an adherent capsular plaque at the time of cataract surgery (2 had previously had intraocular silicone oil tamponade). YAG laser capsulotomy was performed in 10 of these 18 patients during the study period.

Recurrence of retinal detachment after cataract surgery occurred in four (5.6%) patients at 3 weeks, 5 weeks, 5 months, and 8 months following cataract extraction. Two of these eyes had axial lengths greater than 26 mm. Two cases had had one previous vitrectomy, one case had two previous vitreoretinal procedures and the fourth case had three previous vitreoretinal procedures for recurrent retinal detachment before the cataract surgery. The re-detachments after cataract surgery were all attributed to new anterior retinal breaks—three were due to tractional (horseshoe) tears and one an atrophic hole. The re-detachments underwent internal search, residual vitrectomy and, retinopexy—three had intraocular gas and one silicone oil tamponade. All four re-detachments were successfully reattached and achieved final BCVA of 6/6, 6/9, and two of 6/24.

**Table 3** Vision pre- and post-cataract surgery

Snellen visual acuity	Pre-surgery VA frequency (%) n = 72	Post-surgery VA 3/52 frequency (%) n = 72	Post-surgery VA 6/12 frequency (%) n = 59	Post-surgery BCVA at 3/52 and 6/12 frequency (%) N = 72	Post-surgery BCVA at final visit frequency (%) N = 72
≤6/12	19 (26.4)	45 (62.5)	42 (71.2)	50 (69.4)	53 (73.6)
6/18–6/36	32 (44.4)	17 (23.6)	13 (22)	16 (22.2)	12 (16.7)
6/60–1/60	12 (16.7)	7 (9.7)	3 (5.1)	5 (6.9)	6 (8.3)
Less than 1/60	9 (12.5)	3 (4.2)	1 (1.7)	1 (1.4)	1 (1.4)

VA = visual acuity; BCVA = best-corrected visual acuity.



**Figure 1** Vision pre- and post-cataract surgery.

The vision pre- and post-cataract surgery is described in Table 3 and Figure 1. Mean BCVA pre-cataract surgery was 0.89 logMAR and mean BCVA post-cataract surgery was 0.37 logMAR, this was statistically significant ( $P < 0.001$  paired  $t$  test). Three weeks after cataract extraction BCVA was improved in 53 (74%) eyes, unchanged in 14 (19%), and worse in 5 (7%). At 6 months ( $n = 59$ ) BCVA was improved in 48 eyes (81%), and unchanged in 11 (19%). At 3 weeks (13 patients) and 6 months (59 patients) combined results (mean 21.8 weeks) showed that BCVA was improved in 64 (88.9%) and unchanged in 8 (11.1%). At the last clinic follow-up BCVA was improved in 65 (90%), unchanged in 6 (8%), and worse in 1. These results are shown in Figure 2.

Table 4 documents the recorded aetiologies for poor BCVA (worse than 6/12) post-cataract surgery. Specific pathologies were defined in 10 eyes and in 9 the reasons for a poor visual outcome were uncertain but may have been related to macula involvement at the time of retinal detachment.

## Discussion

### Intraoperative events

Intraoperative incidents occurred in nine of the study eyes (12.5%)—generally minor events. Previous studies

quote a perioperative complication rate of 2.9–16.6%.<sup>14–19</sup> The UK National Cataract Audit reported events occurring in 7.5% of cases during surgery.<sup>2</sup> Along with previous reports our study confirms that there is an increase in perioperative events in eyes that have had previous retinal detachment surgery compared with eyes without previous surgery.<sup>2–7</sup> Some perioperative events (eg, zonular dehiscence) may be attributed to zonular or capsular weakness and instability due to previous vitrectomy. Stretching of the zonular apparatus may also occur secondary to the use of expansile gas during retinal detachment repair. Zonular weakness in turn can cause increased iris-lens diaphragm mobility and fluctuations in the anterior chamber (AC) depth during phacoemulsification. Many eyes that have previously developed retinal detachment will be myopic with longer axial lengths and this may also contribute to AC instability during cataract surgery.

### Postoperative events

This study also confirms the higher rate of postoperative events seen in eyes undergoing cataract extraction, which have had previous vitrectomy documented in other reports.<sup>14–20</sup> It is notable that these involve both the structure related to the cataract surgery (eg corneal

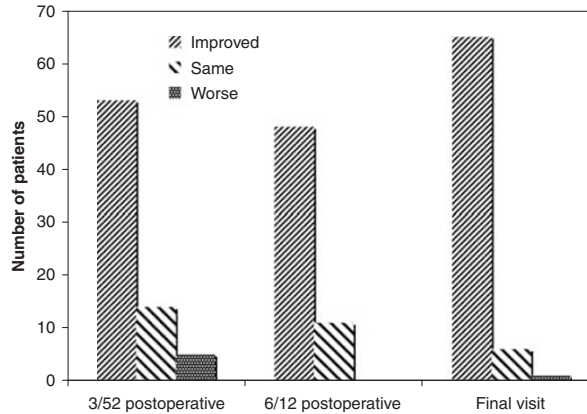


Figure 2 Change in vision post-cataract surgery.

Table 4 Reason for poor VA that is, VA worse than 6/12 post cataract surgery ( $n = 19$ )

Pathology	Frequency
Posterior capsular opacity	1
Epiretinal membrane	3
Age-related macula degeneration	2
Cystoid macula oedema	1
Neurotrophic corneal ulcer	1
Band keratopathy & foveal scar	1
Macula hole	1
Unknown causes	9
Total	19

VA = visual acuity.

wound, lens implant) and the posterior segment (macula oedema, retinal re-detachment).

Posterior capsular opacity

Majority of the cataracts were nuclear sclerotic cataracts (76%), which is the most common morphology after a PPV for retinal detachment repair. In our study 25% of patients had posterior capsule opacification (PCO)—similar to that of other reports.<sup>15,16,19</sup> It is possible that the occurrence of PCO may have been underestimated, as some uncomplicated patients were discharged to their local units relatively early at 3 weeks and may have developed PCO later. At the time of surgery posterior capsular adherent plaques were noted in six eyes, two of these eyes had had retinal detachments treated by vitrectomy and silicone oil. Of the patients noted to have PCO postoperatively, only 10/18 had YAG capsulotomy during the study period and the authors would recommend that the laser be performed on the remaining patients when appropriate. Both intraocular gas and silicone oil may contribute to dense posterior capsular plaques. Cataract surgeons should be prepared

for these in eyes undergoing surgery after previous vitrectomy and advise patients of the potential need for early laser capsulotomy to restore vision.

Retinal re-detachment

Retinal re-detachment after phacoemulsification occurred in four eyes in this study (5.2%)—higher than that in previous studies that report re-detachment rates between 0 and 3.5% in post vitrectomy eyes.<sup>16–18</sup> In reports of cataract surgery after scleral buckle repair of retinal detachment the rate of re-detachment varied from 0 to 15.5%.<sup>8–13</sup> Pischel found retinal detachment in 9/58 eyes (15.5%) but in the more recent studies the rate varies from 0 to 4% in post scleral buckle eyes.<sup>8–13</sup> The re-detachments in our study group appear to be caused by new anterior breaks. These may have formed as a result of stress on the vitreous base caused by traction on any remaining anterior hyaloid (invariable in eyes which have had PPV) during phacoemulsification performed in eyes with an unstable iris lens-diaphragm and fluctuating AC depth.

The risk for re-detachment appears to be higher than the risk for ‘pseudophakic’ detachment in previously unoperated eyes reported by the UK national cataract audit (0.1%).<sup>2</sup> It is interesting to note that over one third (36%) of our patients (26 eyes) had high myopia with AXL greater than 26 mm, two of these eyes re-detached after cataract surgery and it is possible that this may be an additional risk factor for re-detachment. High myopia contributes to variations in the AC depth during phacoemulsification, which can make the surgery technically more challenging. An increased risk of retinal detachment after cataract surgery in myopes with an axial length >23 mm has been noted.<sup>7</sup>

It is possible that eyes that have had previous detachment repair may have undetected (possibly stable) residual peripheral retinal detachment, which cannot be

viewed ophthalmoscopically when there is significant cataract. It may be of value to perform preoperative B scan ultrasound to exclude such detachments where there is an inability to adequately visualize the peripheral retina before cataract extraction. Planned combined phacoemulsification, internal search, and retinal detachment repair may then be undertaken.

### Visual outcomes

Visual improvement was seen in 90% of patients and a vision of less than 6/12 was seen in 73.6% at final follow-up after phacoemulsification in eyes that had previously undergone retinal detachment repair by vitrectomy. This finding is similar to most reports of previous series of eyes that had had cataract extraction after scleral buckling surgery with visual improvement to the 6/12 level in 75–85% of the cases.<sup>8–13</sup> One series reported a lower figure of 52% achieving 6/12 possibly because of differences in retinal detachment case mix.<sup>10</sup>

More recently studies have analysed results of phacoemulsification after PPV carried out for a spectrum of varied vitreoretinal conditions including retinal detachment.<sup>1,14–20</sup> Pinter and Sugar documented that 46% of the eyes had vision of 20/40 or better after cataract extraction following PPV—less than their control group and attributable to a higher rate of surgery related complications and retinal comorbidities in the study eyes.<sup>15</sup> Notably, the results of the current report are similar to the UK National Cataract Audit in which 77% of the eyes with coexisting eye disease achieved a BCVA of 6/12 or better, 3 months after surgery.<sup>2</sup>

Eschete *et al* commented that the preoperative visual potential of the macula is the limiting factor for visual recovery.<sup>9</sup> In our study macula changes such as epiretinal membrane and age-related macula degeneration were noted in 8 of 19 eyes with BCVA worse than 6/12. Additionally 45 of 72 eyes (62.5%) had previously had macula involving retinal detachments (Table 2), which may not result in any clinically evident macula abnormalities. Patients should be provided with a clear understanding of the potential visual acuity after cataract surgery following retinal detachment, particularly when macula changes are noted preoperatively or when the patient is known to have had a macula involving retinal detachment.

Despite the increased risk and complication rate of cataract extraction after retinal detachment repair by pars plana vitrectomy 90% of patients had improvement in BCVA. Patients should be appropriately consented with these results in mind.

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