INTRAOPERATIVE AND POSTOPERATIVE COMPLICATIONS IN PHACOVITRECTOMY FOR EPIRETINAL MEMBRANE AND MACULAR HOLE

A Clinical Audit of 1000 Consecutive Eyes

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Purpose: The aim of this study was to report the intraoperative and postoperative complications of phacovitrectomy for epiretinal membrane (ERM) and macular hole (MH).

Methods: This was a retrospective audit of 1,052 phacovitrectomy operations (410 for ERM and 642 for MH) by the same surgical team between 1998 and 2017. Outcome measures included rates of intraoperative anterior segment and posterior segment complications such as posterior capsule rupture and retinal breaks. A subgroup analysis of 189 procedures in which postoperative complications were rigorously recorded was also undertaken.

Results: The rate of posterior capsule rupture was 2.2%, with no difference between ERM and MH (1.7 vs. 2.5%; $P = 0.40$). Iatrogenic retinal tears were more common in MH than in ERM surgery (15.6 vs. 6.8%; $P < 0.001$). The chance of one or more anterior segment or posterior segment intraoperative complications occurring (excluding iatrogenic retinal breaks) was not associated with: indication for surgery, grade of surgeon, gauge of surgery, surgical machine, diabetic status, patient sex, or patient age. Subgroup analysis showed postoperative events as follows: posterior capsular opacification 10.6% (20/189), posterior synechiae 4.2% (8/189), uveitis 2.1% (4/189), angle closure glaucoma 1.6% (3/189), and rhegmatogenous retinal detachment 1.1% (2/189).

Conclusion: Phacovitrectomy seems to be safe in phakic patients with ERM or MH, performed either by fellows or consultants. It avoids the requirement for repeat surgery and is more cost and resource efficient.

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Vitrectomy may be combined with cataract surgery (phacovitrectomy) in the management of phakic eyes with macular hole (MH) or epiretinal membrane (ERM).[1] Even with minimal preexisting cataract, phacovitrectomy may be preferred to vitrectomy alone to preempt the progression of postvitrectomy cataract and provide quicker overall visual recovery from a single procedure.[2]

Although phacovitrectomy is more time and resource efficient than vitrectomy followed by sequential cataract surgery, there have been concerns that it may be associated with a higher risk of intraoperative and perioperative complications.[1] The effect of longer surgical time and the interaction of posterior segment manipulation and tamponade on anterior segment structures are issues that have been previously raised.[1] Specifically, posterior synechiae formation, small myopic refractive shift, and posterior capsule opacification (PCO) have been reported.[3–5] Whether vitreoretinal (VR) surgeons are as adept at anterior segment surgery compared with high-volume cataract surgeons is another potential debate. However, combined surgery negates the requirement for postvitrectomy cataract surgery which has its own challenges, including an increased risk of posterior capsular rupture and zonular dehiscence.[6] There are also economic

considerations, with phacovitrectomy being up to 20% more cost-efficient than 2-step surgery.[7]

Overall, the published evidence to date suggests that phacovitrectomy is safe in the management of MH and ERM.[8] The literature, however, is confined to small uncontrolled studies on phacovitrectomy and to small comparative case series on phacovitrectomy versus sequential cataract surgery.[4,9,10] There are no large, published series on phacovitrectomy outcomes, which would help to inform the discussion and future decision making.

The aim of this study was to report our institution's experience in more than 1,000 consecutive phacovitrectomy operations performed by the same group of VR surgeons (consultants and fellows) for MH and ERM with emphasis on intraoperative complication rates and with a subgroup analysis on postoperative complications.

Methods

This retrospective, consecutive case series was conducted in accordance with the principles of the Declaration of Helsinki. Ethical approval was obtained by an institutional review board. All VR operations, including phacovitrectomies, performed at our institution since October 1998 under the care of 3 consultant VR surgeons (T.H.W., D.A.H.L., and R.S.W.) have been prospectively recorded on an electronic patient record (EPR) system (Vitreor; AxSys Technologies, Glasgow, United Kingdom). Mandatory data-entry fields for each operation include: laterality of affected eye, indication for surgery, surgical procedure undertaken, and intraoperative complications. The EPR can also record postoperative data including postoperative complications but these data fields are not mandatory.

Main Cohort

An anonymized search was performed for all phacovitrectomy operations undertaken at our institution for MH or ERM between October 1998 and June 2017. The primary outcome was the incidence of intraoperative complications. The rates of specific anterior segment and posterior segment complications were compared by chi-square analysis between: ERMs and MHs; consultants and fellows; 20-G and small-gauge (23-G or 25-G) surgery; and use of the Accurus machine (Alcon Laboratories, Fort Worth, TX) versus the Constellation machine (Alcon Laboratories). Multivariate logistic regression was performed to determine risk factors associated with having one or more anterior segment or posterior segment intraoperative complications, respectively, among the following: indication for surgery (ERM vs. MH), patient age, diabetic status, grade of surgeon (fellow vs. consultant), trocar gauge, and phacovitrectomy machine (Accurus vs. Constellation). For reporting purposes, posterior capsule rupture (PCR) in our study was defined as either 1) a tear of the posterior capsule with or without vitreous loss or 2) vitreous loss with an intact posterior capsule, for example due to zonular rupture, in keeping with the definitions used in large, landmark reports on cataract surgery complications.[11,12] Statistical testing was performed using SPSS version 20 with $P < 0.05$ considered statistically significant.

Postoperative Subgroup

A subgroup of consecutive cases performed by a single consultant (THW) over a 3-year period was identified (the "Post-op" subgroup) where postoperative data including postoperative complications were rigorously recorded. A secondary outcome of the study was to determine for this subgroup the incidence of the following postoperative events: PCO, raised intraocular pressure, uveitis, posterior synechiae (PS), vitreous hemorrhage, retinal detachment, and endophthalmitis.

Surgical Procedure

Cataract surgery was performed by phacoemulsification before vitrectomy as a planned procedure in all cases. Anterior and posterior segment surgeries were performed with the same machine. Before January 2010, the Accurus was used and thereafter the Constellation. Machine settings such as infusion pressure, cut rate, and vacuum varied based on individual surgeon preferences. Capsulorhexis was performed manually in all cases using a needle or forceps.

Results

There were 1,052 phacovitrectomies performed on 991 patients during the study period for either MH (n = 642) or ERM (n = 410). This represented the majority (81%) of all phakic eyes treated for ERM or MH at our institution over the study period and especially in the last 5 years of that period (91%). Demographics

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and operative details are outlined in Table 1. Fellows performed more surgery than consultants but the proportion of fellow cases was similar for both MH and ERM (58 vs. 57% respectively). Patients undergoing MH were statistically younger than those undergoing ERM, but this discrepancy did not seem to be clinically relevant (69.0 vs. 70.4 years, $P = 0.007$). Compared with ERM cases, MH cases were more likely to: be female (71 vs. 50%, $P < 0.001$), involve gas tamponade (99 vs. 12%, $P < 0.001$), use 20-G trocars (47 vs. 35%, $P < 0.001$), and use the Accurus machine (39 vs. 29%, $P = 0.001$). The discrepancy in gauge and instrumentation between ERMs and MHs is a reflection of our institution's changing case-mix over time. Proportionately more MH procedures were performed early in the study period when 20-G trocars and the Accurus machine were standard.

Intraoperative complications are shown in Table 2 with comparisons by: surgical indication (ERM vs. hole), grade of surgeon (consultant vs. fellow), gauge of surgery (20-G vs. small-gauge) and machine (Accurus vs. Constellation). The PCR rate was 2.2% overall in the series. The rate of PCR and the rates of other specific anterior segment complications were not statistically different across any of the comparator groups, with the exception of the rate of AC tears, which were higher for fellows (1.6%) than consultants (0.0%, $P < 0.01$). Regarding posterior segment complications, the only statistically relevant difference across groups occurred in the rates of retinal tears, which were more common in MH (vs. ERM), 20-G surgery (vs. small-gauge surgery), and use of the Accurus machine (vs. Constellation). Post hoc testing confirmed that these three factors in addition to diabetes were statistically correlated with retinal tears ($P < 0.001$) on multivariate regression, whereas patient age, sex, and surgeon grade were not significant ($P > 0.05$).

Multivariate logistic regression found the chance of having one or more anterior segment complications during phacovitrectomy was not associated ($P > 0.05$) with any of the following: indication of surgery (ERM vs. MH), grade of surgeon (fellow vs. consultant), gauge of surgery (20-G vs. smaller gauge), machine (Accurus vs. Constellation), diabetic status of patient, patient sex, or patient age. Likewise, the chance of having one or more posterior segment intraoperative complications (excluding iatrogenic retinal tears) was not correlated with any of these aforementioned variables.

There were 189 phacovitrectomy cases in the "Post-op" subgroup. The demographic data were comparable with the wider study, with a mean age of 68 years, a female preponderance (56%), 61% having surgery for MH, 47% using 20-G trocars, and 60% having surgery using the Constellation. The intraoperative complications were also similar to the wider study with a PC rupture rate of 2.1%. Follow-up ranged from 6 weeks to 14 years with a median of 0.47 years. Postoperative events in descending order of frequency were as follows: PCO (10.6%, n = 20); raised intraocular pressure (5.8%, n = 11), posterior synechiae

Table 1. Demographics and Surgical Details of Phacovitrectomy Cases

	ERM	MH	All	*P**
n	410	642	1,052	—
Mean age (years)	70.4	69.0	69.5	0.007†
Sex	49.6% female	71.2% female	62.8% female	<0.001‡
Diabetes	Yes: 63 (15.4%) No: 347 (84.6%)	Yes: 73 (11.4%) No: 569 (88.6%)	Yes: 136 (12.9%) No: 916 (87.1%)	0.06‡
Grade of surgeon	Cons: 176 (42.9%) Fellow: 234 (57.1%)	Cons: 267 (41.6%) Fellow: 375 (58.4%)	Cons: 443 (42.1%) Fellow: 609 (57.9%)	0.67‡
Machine	Accurus: 117 (28.5%) Constell: 293 (71.5%)	Accurus: 247 (38.5%) Constell: 395 (61.5%)	Accurus: 364 (34.6%) Constell: 688 (65.4%)	0.001‡
Gauge of surgery	25-G: 51 (12.4%) 23-G: 217 (52.9%) 20-G: 142 (34.6%)	25-G: 55 (8.6%) 23-G: 285 (44.4%) 20-G: 302 (47.0%)	25-G: 106 (10.1%) 23-G: 502 (47.7%) 20-G: 444 (42.2%)	<0.001‡
Gas tamponade	Yes: 48 (11.7%) SF_6: 31 (7.6%) C_2F_6: 11 (2.7%) C_3F_8: 6 (1.5%) No: 362 (88.3%)	Yes: 637 (99.2%) SF_6: 53 (8.3%) C_2F_6: 205 (31.9%) C_3F_8: 379 (59.0%) No: 5 (0.8%)	Yes: 685 (65.1%) SF_6: 84 (8.0%) C_2F_6: 216 (20.5%) C_3F_8: 385 (36.6%) No: 367 (34.9%)	<0.001‡
Laser and/or cryotherapy	Yes: 116 (28%)	Yes: 209 (33%)	Yes: 325 (31%)	0.145‡

*Epiretinal membrane versus macular hole.
†Student's *t*-test two-tailed.
‡Chi-square test two-tailed.
Cons, consultant; Constell, Constellation machine; G, gauge.

Table 2. Intraoperative Complications in Phacovitrectomy With Breakdown by Surgical Indication, Surgeon Grade, Trocar Gauge, and Machine

Intraoperative Complication	Total (n = 1,052)	ERM (n = 410)	MH (n = 642)	*P**	Fellow (n = 609)	Consult (n = 443)	*P*†	20g (n = 444)	23g and 25g (n = 608)	*P*‡	Accurus (n = 364)	Constell (n = 688)	*P*§
Anterior Segment													
One or more AS complications	46 (4.4%)	16 (3.9%)	30 (4.7%)	0.55	27 (4.4%)	19 (4.3%)	0.91	23 (5.2%)	23 (3.8%)	0.27	19 (5.2%)	27 (3.9%)	0.33
PCR and/or vitreous loss	23 (2.2%)	7 (1.7%)	16 (2.5%)	0.40	10 (1.6%)	13 (2.9%)	0.16	10 (2.3%)	13 (2.1%)	0.90	9 (2.5%)	14 (2.0%)	0.64
AC tear¶	10 (1.0%)	4 (1.0%)	6 (0.9%)	0.94	10 (1.6%)	0 (0.0%)	0.007	4 (0.9%)	6 (1.0%)	0.89	3 (0.8%)	7 (1.0%)	0.76
Iris trauma/ prolapse	6 (0.6%)	2 (0.5%)	4 (0.6%)	0.77	3 (0.5%)	3 (0.7%)	0.70	4 (0.9%)	2 (0.3%)	0.22	3 (0.8%)	3 (0.4%)	0.43
Zonular dialysis	6 (0.6%)	2 (0.5%)	4 (0.6%)	0.77	6 (1.0%)	0 (0.0%)	0.05	3 (0.7%)	3 (0.5%)	0.70	2 (0.5%)	4 (0.6%)	0.95
Lens exchange/ other IOL problems	5 (0.5%)	3 (0.7%)	2 (0.3%)	0.33	1 (0.2%)	4 (0.9%)	0.17	3 (0.7%)	2 (0.3%)	0.42	3 (0.8%)	2 (0.3%)	0.23
Dropped lens	0 (0.0%)	0 (0.0%)	0 (0.0%)	—	0 (0.0%)	0 (0.0%)	—	0 (0.0%)	0 (0.0%)	—	0 (0.0%)	0 (0.0%)	—
Other	0 (0.0%)	0 (0.0%)	0 (0.0%)	—	0 (0.0%)	0 (0.0%)	—	0 (0.0%)	0 (0.0%)	—	0 (0.0%)	0 (0.0%)	—
Posterior segment													
Retinal tears	128 (12.2%)	28 (6.8%)	100 (15.6%)	<0.001	81 (13.3%)	47 (10.6%)	0.19	77 (17.3%)	51 (8.4%)	<0.001	64 (17.6%)	64 (9.3%)	<0.001
Vitreous Hg	2 (0.2%)	1 (0.2%)	1 (0.2%)	0.99	0 (0.0%)	2 (0.5%)	0.18	1 (0.2%)	1 (0.2%)	0.82	0 (0.0%)	2 (0.3%)	0.30
Subretinal Hg	2 (0.2%)	1 (0.2%)	1 (0.2%)	0.99	1 (0.2%)	1 (0.2%)	0.99	1 (0.2%)	1 (0.2%)	0.82	1 (0.3%)	1 (0.1%)	0.65
Choroidal or suprachoroidal Hg	7 (0.7%)	2 (0.5%)	5 (0.8%)	0.71	3 (0.5%)	4 (0.9%)	0.46	2 (0.5%)	5 (0.8%)	0.46	2 (0.5%)	5 (0.7%)	0.74

*Chi-square two-tail tested for epiretinal membrane versus macular hole.
†Chi-square two-tailed test for fellow versus consultant grade surgeon.
‡Chi-square 2-tailed test for 20-gauge surgery versus small-gauge (23- or 25- gauge) surgery.
§Chi-square two-tailed test for Accurus machine versus Constellation machine.
¶Anterior capsule tear refers to either run-out of the anterior capsule during capsulorhexis or tears to a normal capsulorhexis occurring during the remainder of phacoemulsification surgery.
AC, anterior capsule; AS, anterior segment; Constell, constellation; Consult, consultant surgeon; G, gauge; IOL, intraocular lens; Hg, hemorrhage; PC, posterior capsule.

Table 3. Anterior Segment Complications Compared With the Cataract-Only Literature

Intraoperative Complications	This Study (n = 1,052)	RCONOD[11] (n = 180,114)	NCD[15] (n = 55,567)
One or more complications (AS or SCH)	4.9%	4.2%	4.6%
PCR and/or vitreous loss	2.2%	2.0%	1.9%
Other	1.0%	0.7%	1.1%
Iris trauma/prolapse	0.6%	0.5%	0.6%
Zonular dialysis	0.6%	0.5%	0.5%
Epithelial abrasion	0.0%	0.3%	0.2%
Endothelial damage/Descemet's tear	0.0%	0.2%	0.3%
Nuclear/epinuclear fragment into vitreous	0.0%	0.2%	0.2%
Corneal edema	0.0%	0.1%	0.1%
Lens exchange/other IOL problems	0.5%	0.1%	0.1%
Phaco burn/wound problems	0.0%	<0.1%	0.2%
Hyphema	0.0%	<0.1%	<0.1%
Choroidal/suprachoroidal hemorrhage	0.7%	<0.1%	<0.1%

AS, anterior segment; IOL, intraocular lens; NCD, National Cataract Dataset; PC, posterior capsule; RCONOD, Royal College of Ophthalmologist's National Ophthalmology Database; SCH, suprachoroidal hemorrhage.

(4.2%, n = 8), uveitis (2.1%, n = 4), ocular surface disease (2.1%, n = 4), angle closure glaucoma (ACG, 1.6%, n = 3), persistent CMO (1.6%, n = 3), retinal detachment (1.1%, n = 2), early gas dissipation (1.1%, n = 2), vitreous hemorrhage (0.5%, n = 1), toxic anterior segment syndrome (0.5%, n = 1), refractive surprise (0.5%, n = 1), and endophthalmitis (0.0%, n = 0). Of the 8 patients who developed PS, none had intraoperative complications, all had gas tamponade and 6 (75%) occurred with 20-G surgery. Eight percent (6/88) of 20-G cases developed PS versus 2% (2/101) for small-gauge ($P = 0.10$).

Overall, there were 3 cases of ACG in the postoperative subgroup. One case occurred in the early postoperative period, whereas the other 2 presented as delayed events at 6 months and 3 years. All 3 cases involved gas tamponade (2 with C_3F_8 and 1 with C_2F_6) and none were associated with any intraoperative complications. Two ACG cases were successfully treated using peripheral iridotomy and medical therapy, while 1 required glaucoma drainage surgery.

Discussion

We performed a large, retrospective audit on the safety of phacovitrectomy surgery. Anterior segment intraoperative complications in our series were comparable with rates reported in recent cataract-only series. Posterior capsule rupture is widely regarded as an indicator of the quality of cataract surgery and, in our series, measured 2.2%.[11–14] In 2 large, multicentre studies on cataract surgery using EPR data from the United Kingdom, PCR rates were 1.92% (from the National Cataract Dataset) and 1.95% (from the Royal College of Ophthalmologists' National Ophthalmology Database, RCONOD) in 55,567 and 180,114 cataract operations, respectively.[11,12,15] In addition to PCR, the rates of other anterior segment complications in our phacovitrectomy series were similar to results from the aforementioned EPR-based cataract reports, as shown in Table 3.

Suprachoroidal hemorrhage after cataract surgery occurred in 0.05% and 0.07% of cases in the RCONOD[11] and National Cataract Dataset series,[15] respectively. The rate in our phacovitrectomy series was considerably greater at 0.7%. However, allowance must be made for the additional risk with pars plana vitrectomy. We have previously published on suprachoroidal hemorrhage after pars plana vitrectomy alone, with incidences of 1.0 and 0.6% for 20-G and 23-G surgery, respectively.[16] This indicates that compared with sequential surgery, the risk of suprachoroidal hemorrhage in our phacovitrectomy series was acceptable.

Analysis of intraoperative complications (Table 2) revealed that retinal tears were more common with: MH (vs. ERM), 20-G (vs. small-gauge) surgery, and Accurus (vs. Constellation) machinery. The association of retinal tears with MH over ERM has been reported elsewhere[17] and most likely reflects the discrepancy in PVD status between the two conditions, with a greater proportion of MHs requiring PVD induction. The association of tears with larger trocar gauge[16–19] and with lower cut-rate machines[20] is again

consistent with previous reports on vitrectomy-only surgery—and is consistent with the widely acknowledged effect these instrumentation factors have on intraoperative vitreous traction. Because of limitations in our data collection, specific machine settings such as vacuum and cut rates were not faithfully recorded for each case; so, we could not explore the independent contribution of these factors in our study.

Although larger trocar gauge and older, lower cut-rate machinery were correlated with retinal tears, it was interesting that these instrumentation factors were not correlated with an increased risk of one or more (nonretinal tear) posterior segment complications. This may reflect a lack of statistical power in our study, given that hemorrhagic posterior segment complications (e.g., suprachoroidal hemorrhage) occur at such low rates in phacovitrectomy. However, our findings may be considered consistent with a previous report on vitrectomy-only surgery, where no overall statistical difference in suprachoroidal hemorrhage rates was found between 20-G and 23-G surgery.[16]

Regarding postoperative complications, PCO requiring YAG capsulotomy was the most common event with an incidence of 10.6%. This rate compares favorably with previous reports of PCO in vitrectomized eyes where incidence has varied between 10% and 51%.[6,21–26] Vitrectomy before or combined with cataract surgery is a recognized risk of PCO.[25,26] Our relatively low rate may be attributable to our standard IOL, which was a hydrophobic acrylic lens (AcrySof SA60AT; Alcon) known to have a low propensity for PCO after cataract-only surgery.[27] All eyes in our postoperative subgroup were operated by a single surgeon who aimed to leave the posterior capsule intact (surgeon preference). Some surgeons in our unit perform prophylactic posterior capsulotomy with the vitrectomy cutter to prevent PCO.[28]

Our subgroup retinal detachment rate was 1.1%, which is consistent with RCONOD data of 1.0% and 2.4% for PPV in ERM and MH, respectively.[29,30] The incidence of PS formation was 4.2% in our subgroup, which is comparable with a previous report by Oh et al[31] (6.1%) on 23-G phacovitrectomy. Posterior synechiae seems to be less common with small-gauge phacovitrectomy than traditional 20-G surgery, where rates in some series have been as high as 19% to 34%.[32] This trend was evident in our own results; although PS occurred in 6.8% (6/88) of 20-G cases in the postoperative subgroup, it occurred in only 2% (2/101) of small-gauge (23-G and 25-G) cases ($P = 0.10$).

Posterior synechiae formation is very uncommon after routine cataract surgery. Its occurrence after phacovitrectomy may be attributed to the effect of tamponade agents on the iris-capsular-bag diaphragm. All eight cases of PS in our series involved gas tamponade. Gas and oil tamponade have been linked with PS formation after phacovitrectomy in previous reports.[31] A proinflammatory effect from combined surgery may also play a role in PS formation, with prolonged surgical time associated with PS in some series.[31] Two of eight cases of PS in our series occurred in the context of active uveitis.

The incidence of uveitis in our series (2.1%) was higher than one would anticipate after routine cataract surgery, where the incidence from large series has been reported as low as 0.24%.[33] Rates of uveitis after vitrectomy alone for macular disease are not well documented. It was our standard practice to prescribe either dexamethasone 0.1% or prednisolone acetate 1% drops QDS for 4 weeks for combined cases, which was the same protocol we used in cataract-only cases. Our practice in this regard is consistent with a recent survey of VR surgeons, which found that the majority use the same anti-inflammatory protocol for phacovitrectomy as for cataract-only cases, despite these surgeons reporting that phacovitrectomy is more inflammatory than cataract surgery alone.[34] This paradox suggests the need for further research to standardize best practice. Our study lends support to the rationale for increasing the frequency of steroid drops and/or using adjuvant anti-inflammatory drops for combined cases to counteract these inflammatory tendencies.

In 3 cases in our series (1.5%), ACG developed. All 3 cases had uncomplicated surgery with gas tamponade. A similar incidence of ACG (1.82%) was reported by Raj et al[35] in their series of 493 phacovitrectomies, although all their ACG cases occurred with oil rather than gas. After routine cataract surgery, ACG is exceedingly rare. In vitrectomy-only cases, an early intraocular pressure spike with a shallow anterior chamber can occur due to gas overfill, ciliary body rotation, or gas trapped behind the iris in the posterior chamber.[36] However, late ACG is rarely reported in these cases. Our findings suggest that patients counseled for combined surgery should be warned of this additional risk. The fact that 2 of 3 ACG cases presented more than 6 months after phacovitrectomy highlights the importance of advising patients, even those who have had uncomplicated surgery, of the importance of annual intraocular pressure monitoring.

We did not assess refractive outcomes in this study but have previously reported a small myopic shift (approximately −0.3D) in phacovitrectomy for macular disease compared with routine cataract surgery.[37] This is consistent with several other reports.[38,39]

Significantly, we observed the same magnitude myopic shift with sequential cataract surgery after previous vitrectomy as with combined phacovitrectomy,[37] suggesting that factors related to vitrectomy (or a history of vitrectomy) are likely to explain myopic shift rather than factors inherent to combined surgery as such. The size of myopic shift in combined surgery in both our own experience and in much of the literature[37–39] has been small in absolute terms and can be mitigated by optimizing biometric constants.

Aside from MH and ERM, combined phacovitrectomy may be useful in other VR pathologies such as diabetic retinopathy, retinal detachments, or trauma, particularly when there is significant lens opacification obscuring fundal views.[1,40] We did not extract data for these patients because of the varying baseline characteristics and prognostic outcomes of this heterogeneous group. In eyes requiring surgery for diabetic retinopathy, it has been our practice to limit combined surgery to cataracts that impair the operative view because vitrectomy has been shown to induce less cataract in diabetic vitrectomy.[41] In addition, we prefer to avoid prolonging intraocular surgery in diabetic patients in whom retinal surgery is likely to be more complex in the first place.

The main limitation of our study was its retrospective design. The integrity of EPR data entered in the time-pressured clinical environment may be compromised by inaccuracies and omissions. There is also a well-documented tendency for surgeons to underrecord their complications.[42] For these reasons, we chose to compare the complication rates in our series against studies that have faced similar constraints: where data has been extracted retrospectively from EPR platforms.

Our results provide important evidence for the safety profile of phacovitrectomy surgery when undertaken by VR consultants and fellows. Anterior segment intraoperative complications were similar to published rates encountered with cataract surgery alone, whereas posterior segment complications were similar to those encountered with vitrectomy alone. Vitreoretinal surgeons at our institution frequently perform cataract surgery, whereas this may not be the case in all units. This variability could influence the decision on whether to perform combined surgery. The decision should also take account of patient factors, especially age. Patients aged 50 years and younger are less likely to develop postvitrectomy cataract.[43] They are also more likely to have clear lenses and residual accommodative function so that lens extraction is best avoided. An informed discussion on the risks and benefits of combined surgery is essential in all cases, including the risks of refractive errors and postoperative inflammation. In our subgroup analysis, postoperative safety was acceptable, although the rates of uveitis and ACG seemed higher than would be encountered after cataract surgery alone. Further research is required on ways to minimize these events postoperatively. Preemptive anti-inflammatory treatment and regular postoperative monitoring are recommended. As instrumentation improves, these complications are likely to become rarer and this trend was observed in our own series. It is our unit's standard practice to perform phacovitrectomy in most phakic patients with ERM or MH even where cataract is mild. Phacovitrectomy avoids the additive risks associated with repeat surgery and is more time, cost, and resource efficient.[7]

Key words: epiretinal membrane, macular hole, phacovitrectomy, complications, safety, postoperative, intraoperative.

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