SCIENTIFIC REPORT

Presbyopic phacovitrectomy

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Aim: To review the results and complications of combined phacoemulsification and vitrectomy in presbyopic patients.
Methods: Retrospective review of 90 consecutive presbyopic patients who underwent phacoemulsification and vitrectomy for primary rhegmatogenous retinal detachment (RRD) (21), redo-RRD (seven), stages 2 and 3 full thickness macular holes (FTMH) (38), stage 4 FTMH (six), idiopathic epiretinal membrane (ERM) (11), proliferative diabetic retinopathy (PDR) (three) and vitreous haemorrhage secondary to branch retinal vein occlusion (BVO) (four).
Results: Lens opacity was absent or mild in 84.5% of patients. Reattachment rates for primary RRD and redo-RRD after one procedure were 90.5% and 71.4% and final reattachment rates were 95.2% and 100%, respectively. Macular hole closure rate was 89.5% for stage 2 and 3 FTMH and 83.3% for stage 4 FTMH. There was significant improvement in the median logMAR visual acuity from 1.00 preoperatively to 0.48 postoperatively for the whole cohort ($p<0.001$, Wilcoxon test). Postoperative complications included fibrinous uveitis (13.3%), iris bombe (2.2%), IOL/iris capture secondary to gas overfill (1.1%), and posterior capsule opacification (51.1%).
Conclusion: Combined phacoemulsification and vitrectomy is a safe and desirable option in the management of phakic, presbyopic patients with vitreoretinal pathologies that warrant vitreous surgery, even in the absence of significant lens opacity.

The crystalline lens in presbyopic patients has already lost the ability to accommodate. Vitrectomy and intraocular tamponade invariably result in cataract formation.[1] Lens extraction at the time of vitrectomy may improve the intraoperative view, facilitate a more complete vitrectomy, allow for a larger fill with tamponade agent, and prevent the patient from having to return for potentially more difficult cataract surgery.[2–4] Some studies however have shown a higher incidence of postoperative uveitis[2 5] and intraocular lens (IOL) complications[5 6] in combined surgery. This study assessed the outcome of 90 consecutive presbyopic patients who underwent combined phacovitrectomy.

PATIENTS AND METHODS

Ninety two presbyopic patients with a mean age of 70.4 years (range 61–91) underwent phacovitrectomy between November 1997 and June 2001. Information on 90 patients (32 men, 58 women) was available for analysis. Lens opacity was graded as absent in 23 (25.6%), mild in 53 (58.9%), moderate in 12 (13.3%), and marked in two (2.2%) patients.

Phacoemulsification was performed through a clear corneal wound. If the surgery required extensive globe manipulation (such as suturing a scleral buckle), a single 10/0 Nylon suture was placed in the corneal wound before vitrectomy. A wide angle viewing system was used during the vitrectomy. The IOL was implanted into the capsular bag under viscoelastic following vitrectomy. The IOL power was chosen directly from biometry of the affected eye when such measurements were possible. In cases when biometry in the affected eye was not possible (macular off retinal detachment and dense vitreous haemorrhage), decisions on IOL power were based on biometry of the fellow eye. For cases in which an encircling band was used, IOL power was calculated for emmetropia rather than aiming for a −0.50 refractive outcome.

RESULTS

Indications

Table 1 summarises the indications for phacovitrectomy. The macula was detached in 16 (76.2%) of the 21 patients with primary RRD. Four (19.0%) patients with primary RRD had preoperative proliferative vitreoretinopathy (PVR) grade C1 or worse, and three (14.3%) had giant retinal tears. The macula was detached in all seven patients with redo-RRD before reoperation, five (71.4%) of whom had preoperative PVR of grade C1 or worse. One patient with proliferative diabetic retinopathy (PDR) had tractional retinal detachment (TRD), the remaining two had vitreous haemorrhages without TRD.

Surgical results

Ninety eight per cent of patients had general anaesthesia. The mean follow up for the whole cohort was 8.4 months (range 1.3–35.3). Table 2 summarises the surgical results and the preoperative and postoperative Snellen converted logMAR visual acuity (VA).

There was a significant improvement in the postoperative Snellen converted logMAR visual acuity[7] in the whole cohort ($p<0.05$, Wilcoxon test). There was also a significant improvement in VA in each indication subgroup, with the exception of patients with proliferative diabetic retinopathy and those with vitreous haemorrhage secondary to branch retinal vein occlusion. The final VA in these patients was limited by pre-exiting diabetic maculopathy and macula involvement in branch vein occlusion.

Table 1 Indications for phacovitrectomy

Indications	Number (%)
Primary RRD	21 (23.3)
Redo RRD	7 (7.8)
Stage 2 and 3 FTMH	38 (42.2)
Stage 4 FTMH	6 (6.7)
Idiopathic ERM	11 (12.2)
PDR	3 (3.3)
VH/BVO	4 (4.4)

RRD = rhegmatogenous retinal detachment, FTMH = full thickness macular hole, ERM = epiretinal membrane, PDR = proliferative diabetic retinopathy, VH /BVO = vitreous haemorrhage secondary to branch retinal vein occlusion.

Table 2 Surgical results: preoperative and postoperative logMAR visual acuity (VA) of the patients

Indications	Surgical outcome	Preop VA Median (range)	Postop VA Median (range)	p Value (Wilcoxon)
Primary RRD (21)	Primary reattachment 19 (90.5%) Final reattachment 20 (95.2%)	2.20 (0–2.50)	0.48 (0–2.50)	0.003
Redo-RRD (7)	Reattachment after redo-RRD 5 (71.4%) Final reattachment after re-interventions 7 (100%)	2.20 (0.78–2.50)	0.60 (0–1.00)	0.044
Stage 2 and 3 FTMH (38)	Primary hole closure 34 (89.5%)	0.78 (0.30–1.90)	0.30 (0–1.00)	<0.001
Stage 4 FTMH (6)	Primary hole closure 5 (83.3%)	1.00 (1.00–1.90)	0.60 (0.48–1.00)	0.041
Idiopathic ERM (11)		0.48 (0.18–1.90)	0.18 (0–0.78)	0.005
PDR (3)		1.90 (1.90–2.50)	0.30 (0.18–1.90)	0.18
VH/BVO (4)		2.20 (1.90–2.50)	0.48 (0–1.90)	0.11
Overall (90)		1.00 (0–2.50)	0.48 (0–2.50)	<0.001

RRD = rhegmatogenous retinal detachment, FTMH = full thickness macular hole, ERM = epiretinal membrane, PDR = proliferative diabetic retinopathy, VH/BVO = vitreous haemorrhage secondary to branch vein occlusion.

Complications

No preoperative phacoemulsification complications were encountered in any patient. Table 3 summarises vitrectomy and postoperative complications. Fibrin was present postoperatively in the anterior chamber in 12 (13.3%) patients. Seven of these had PVR grade C1 or worse, and underwent extensive laser retinopexy and scleral buckling during surgery for RRD. Five (5.6%) patients with PVR and postoperative fibrin also developed posterior synechiae (PS) of more than 3 clock hours to the IOL. Two (2.2%) of these patients had 360 degree PS and iris bombe requiring YAG peripheral iridotomies. One (1.1%) patient with C_2F_6 tamponade developed IOL/iris capture secondary to gas overfill. Posterior capsule opacification was the most common postoperative complication, which occurred in 46 (51.1%) patients.

Postoperative refraction

Information on the postoperative refraction was available for 71 (78.9%) patients as detailed in Table 4. The mean spherical targeting error (difference between the spherical equivalence of postoperative refraction and biometry predicted refraction) was −0.93 dioptres (range –4.75 to + 1.50) for the whole cohort.

DISCUSSION

The main reason for removing the crystalline lens in previous reports of combined phacovitrectomy is the presence of ''significant'' or ''dense'' cataract that prevents adequate visualisation of the retina during surgery. In our series this was not a primary concern as lens opacity was either absent or mild in the majority of patients (84.5%).

The combined approach has many benefits for both surgeon and patient. Aphakia combined with a wide angle viewing system offers the surgeon an excellent view of the retinal periphery. This facilitates a more complete vitrectomy, reducing the likelihood of further vitreous separation with new tear formation in the postoperative period.[8] A larger gas fill is also possible by the more complete vitrectomy. This makes anatomical closure of macular hole possible with limited or no prone posturing.[4 9] A large gas fill is also desirable for effective tamponade of most retinal breaks. Combining lens removal at the time of the vitrectomy prevents the patient from returning for subsequent cataract surgery, which can be technically more challenging owing to the lack of vitreous support after vitrectomy.[10]

These advantages of combined surgery are likely to contribute to the following results in our series. The anatomical success rate in primary RRD and redo-RRD compares favourably with other series.[11–13] No failures in retinal reattachment were caused by ''missed'' retinal breaks, perhaps secondary to the excellent visualisation of the retinal periphery. Significant visual improvements occurred in most indication subgroups (with the exception of those with pre-existing maculopathy) over a relatively short mean follow up period of less than 9 months.

Table 3 Vitrectomy and postoperative complications

	Overall (n = 90)	Primary RRD (n = 21)	Redo-RRD (n = 7)	Stage 2, 3 FTMH (n = 38)	Stage 4 FTMH (n = 6)	ERM (n = 11)	PDR (n = 3)	VH/BVO (n = 4)
Entry site break	3 (3.3%)	1 (4.8%)	Nil	1 (2.6%)	1 (16.7%)	Nil	Nil	Nil
Inadvertent retinotomy	1 (1.1%)	Nil	1 (14.3%)	Nil	Nil	Nil	Nil	Nil
Iatrogenic break during PHF peel	12 (13.3%)	Nil	Nil	11 (28.9%)	Nil	1(9.1%)	Nil	Nil
Fibrin in AC	12 (13.3%)	6 (27.3%)	3 (42.9%)	2 (5.3%)	Nil	Nil	1 (33.3%)	Nil
Posterior synechiae	5 (5.6%)	2 (9.1%)	Nil	3 (7.9)	Nil	Nil	Nil	Nil
Iris bombe requiring YAG PI	2 (2.2%)	2 (9.5%)	Nil	Nil	Nil	Nil	Nil	Nil
IOL/iris capture secondary to gas overfill	1 (1.1%)	1 (4.5%)	Nil	Nil	Nil	Nil	Nil	Nil
PC opacification	46 (51.1%)	10 (47.6%)	4 (57.1%)	25 (65.8%)	3 (50%)	3 (27.3%)	1 (33.3%)	Nil

RRD = rhegmatogenous retinal detachment, FTMH = full thickness macular hole, ERM = epiretinal membrane, PDR = proliferative diabetic retinopathy, VH/BVO = vitreous haemorrhage secondary to branch vein occlusion, PHF posterior hyaloid face, AC = anterior chamber, PI = peripheral iridotomy, PC = posterior capsule.

Table 4 Postoperative refraction for each indication subgroup

Indications	% of patients with postoperative refraction	Mean (range) of spherical targeting error (dioptres)
Primary RRD	52	−1.05 (−4.75 to +1.50)
Redo-RRD	57	−1.81 (−2.25 to −1.50)
Stage 2 and 3 FTMHs	89	−0.85 (−3.00 to +1.50)
Stage 4 FTMHs	83	−0.95 (−2.00 to +0.50)
Idiopathic ERM	100	−0.61 (−1.25 to +0.50)
PDR	100	−1.25 (−2.75 to −0.50)
VH/BVO	75	−1.00 (−1.50 to 0)
Overall	79	−0.93 (−4.75 to +1.50)

RRD = rhegmatogenous retinal detachment, FTMH = full thickness macular hole, ERM = epiretinal membrane, PDR = proliferative diabetic retinopathy, VH/BVO = vitreous haemorrhage secondary to branch vein occlusion.

Possible disadvantages of simultaneous cataract and vitreoretinal surgery,[14] such as loss of corneal transparency, instability of the cataract wound during globe manipulation, intraoperative miosis after phacoemulsification, and bleeding from anterior structures were not encountered.

Although iatrogenic retinal tears during posterior hyaloid delamination in macular hole surgery occurred in a significant number of patients (28.9%) with stage 2 and 3 FTMH, these were all recognised and treated intraoperatively, with no subsequent postoperative retinal detachment.

The incidence of postoperative fibrinous uveitis (13.3%) in our cohort is comparable to previous reports.[5 14] Stability of the anterior chamber is of importance in reducing postoperative uveitis. The anterior chamber should be of normal depth at all times. Suturing the corneal wound before placing buckles reduces the likelihood of inadvertent pouting of the corneal wound with loss of viscoelastic and shallowing of the anterior chamber. The patient should be observed closely for the first 2 postoperative days as fibrin may only develop on the second day. Most cases of fibrin formation were mild and resolved with topical steroid. Rubeosis was not noted in our cohort, although the number of patients with proliferative diabetic retinopathy and ischaemic branch vein occlusion were small. Diabetic patients with clear lenses are less likely to develop cataract following vitrectomy but are more prone to fibrinous uveitis and rubeosis following lens removal. We would not recommend routine phacovitrectomy in diabetic patients or patients with ongoing uveitis unless significant lens opacity was present.

Difficulties predicting the refractive outcome may be expected in patients having encirclement procedures which could potentially increase axial length and therefore myopia. Only 10 patients in the series had encirclement and refractive data were available for four patients only (mean −1.62 dioptres, range −4.75 to +1.00), so no conclusions can be drawn from these data.

Forty six (51.1%) patients developed significant posterior capsule opacification requiring YAG capsulotomy. Retinal detachment or reopening of macula hole has not occurred after YAG capsulotomy to date. This may relate to the fact that most vitreoretinal connections have been removed by the vitrectomy and early YAG capsulotomy may be safe. In view of the high incidence of posterior capsule opacification in combined surgery it may be worth considering primary capsulotomy at the time of surgery after the IOL has been implanted.

Combined phacoemulsification and vitrectomy is a safe and desirable option in the management of phakic, presbyopic patients with vitreoretinal pathologies that warrant vitrectomy surgery. We believe that the advantages offered by this technique outweigh any possible disadvantages, even in eyes without significant lens opacity.

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