European Journal of Ophthalmology / Vol. 11 n. 2, 2001 / pp. 166-170

Recurrences of retinal detachment after vitreoretinal surgery, and surgical approach

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PURPOSE. *To investigate the causes and management of recurrences of complicated retinal detachment after vitreoretinal surgery.*
METHODS. *Vitreoretinal surgery was performed in 61 patients with complicated retinal detachment who were followed up for 4-24 (mean 7) months. Liquid perfluorocarbon (PFC) was used in all 61, silicone oil in 40 and perfluoropropane (C3F8) in 18 patients.*
RESULTS. *Retinal attachment was achieved in 58 patients (95%) during the first operation. Due to the recurrence of detachment 17 patients (29%) had to be operated for a second, 7 (12%) a third and 4 (7%) a fourth time. Anterior and posterior proliferative vitreoretinopathy, missed tear, retinal incarceration, subretinal membrane and perisilicone proliferation were the factors causing redetachment.*
CONCLUSIONS. *The best anatomical and functional results are obtained by dissection of the anterior membranes. In order to properly remove the retinal periphery the crystalline or intraocular lens should be removed. Comparison of our results with others indicates that anatomical success depends, to a certain extent, on doing only one, radical operation on the pathology that leads to recurrence. (Eur J Ophthalmol 2001; 11: 166-70)*

KEY WORDS. *Retinal detachment, Vitrectomy, Proliferative vitreoretinopathy, Silicone oil*

Accepted: May 29, 2000

INTRODUCTION

Complicated retinal detachments result from the proliferation of nonvascular membranes and these pathologies tend to recur. Thanks to rapid developments in vitreoretinal surgery, the once 14% anatomical success has risen to almost 80% (1). The increasing number of patients has nevertheless brought with it a greater number of recurrences. In the face of a recurrent retinal detachment, the doctor has an unhappy patient who has already had a serious operation, with little or no improvement and who now is in a more complicated state of health than he was before the first operation. We examined the clinical findings of cases with recurrent detachment in the aftermath of vitrectomy and discuss the various treatment options.

MATERIALS AND METHODS

Sixty-one consecutive patients with complicated retinal detachment were operated with vitreoretinal surgery techniques between 1995 and 1998; 27 (44%) were female and 34 (56%) male. Their mean age was 51.2 (±7.7) years (range 15-78 years). Retinal attachment was achieved in 58 (95%) patients during surgery. Of those 40 (69%) were given silicone oil as a long-acting internal tamponade for the postoperative period. This was removed from 29 of the 40 (73%) after a mean period of four months. Perfluoropropane (C3F8) gas was used as an extended intraocular tamponade in 18 patients (31%). The patients were followed-up for from 4 to 24 months (mean 7 months). In 17 cases (29%) the operation had to be repeated because

1120-6721/166-05$02.50/0

of recurrence of the detachment.

The cases of the recurrent complicated retinal detachment are set out in Table I. The majority had traumas and proliferative vitreoretinopathy (PVR), 22% with PVR and 45% of those who had perforating eye traumas were recorded as having recurrent detachment. Recurrence occurred in 11 (28%) of the cases who had been treated with silicone oil and six (33%) of those treated with C3F8. Of the patients given silicone oil, six had the recurrence after removal of the oil and the rest had it while the oil was still in the eye.

The reasons for the recurrences are summarized in Table II. In 3 of the patients who had a recurrence after the removal of silicone oil a retinal tear, which had not been noticed before, was detected. All the patients in this group had anterior PVR; 11 had posterior focal or diffuse epiretinal membrane. Perisilicone proliferation intensifying particularly at the lower hemisphere was observed in five patients. In four a subretinal membrane formed that was noticeable from below the detached retina. In two patients with perforating eye trauma, diffuse subretinal membrane and retinal incarceration was noted in the perforated section of the posterior pole.

The extent of the proliferation dictated the surgical procedure. Our surgical sequence in the management of recurrent retinal detachment is set out in Table III. IOL was removed in four patients and the crystalline lens in three. Nine patients (53%) underwent retinotomy about 90 to 360° to serve as peripheric relaxation. Liquid PFC (perfluorocarbon), that was used in all the operations, was replaced with silicone oil at the end (Tab. IV). Due to the recurrence of detachment, seven patients had to be operated for a third and four for a fourth time.

RESULTS

Intraoperative attachment was achieved in 13 (76%) patients out of 17 who had developed recurrent retinal detachment. Patients were followed-up for an average of seven months and at the last examination the retinas of nine (53%) were still attached. The success rate of the reoperations according to the etiology is listed in Table V. Of the four cases that developed retinal detachment, two still had the silicone oil in the eye and the other two had had the oil removed. The oil in six of 13 patients (46%) was removed four months later. After the removal of the oil, two patients developed hypotony, and 2 phthysis bulbi, and in the last two retinal detachments recurred. The retina of six patients (67%) out of nine who had undergone retinotomy remained attached. Intra and postoperative complications are listed in Table VI.

Pre and postoperative visual acuities of the patients with recurrent complicated retinal detachment are listed in Table VII. At the last examination visual acuity had improved in nine patients (53%), remained the same in six (35%) and had deteriorated in the last two (12%).

DISCUSSION

The anatomical and visual results of vitreoretinal surgery for severe PVR have improved significantly over the last years. The causes of failure in order of importance are: newly formed tears with anterior PVR or the opening of previous ones; proliferation; recurrent proliferation at the vitreous base-anterior PVR; the opening of an old tear due

TABLE I – CAUSES OF RECURRENT RETINAL DETACHMET IN 58 PATIENTS

Etiology	Etiology/All cases	Etiology/Total redetachment	Redetachment/Etiology
PVR	41 (71%)	9 (53%)	22%
Perforating injury	11 (19%)	5 (29%)	45%
Cicatricial ROP	1 (2%)	1 (6%)	100%
Posterior pole tear	2 (3%)	1 (6%)	50%
Giant tear	3 (5%)	1 (6%)	33%

PVR: proliferative vitreoretinopathy
ROP: retinopathy of prematurity

to lack of chorioretinal adhesion, and posterior preretinal proliferations (2, 3). In addition the continuous oil tamponade creates a persistent surface for reproliferation as well as containing and concentrating mitogenic substances in the limited preretinal fluid that exists in a silicone oil-filled eye (especially inferiorly and circumferentially over the vitreous base); this is called perisilicone proliferation. Thus, the most significant factor that leads to recurrent detachment is reproliferation, especially on the vitreous base.

TABLE II - REASONS FOR RECURRENCES

	Cases
Anterior PVR	17
Posterior PVR	11
Missed tear	3
Retinal incarceration	2
Subretinal membrane	4
Perisilicone proliferation	5

TABLE III - SURGICAL SEQUENCE IN THE MANAGEMENT OF RECURRENT RETINAL DETACHMENT

1 - Revision of scleral buckle (only if required)
2 - Management of the pupil with iris retractors (only if required)
3 - Removal of the lens or intraocular lens
4 - Posterior epiretinal membrane dissection
5 - Injection of perfluorocarbon liquids
6 - Anterior and equatorial epiretinal membrane dissection
7 - Subretinal membrane dissection (only if required and after the liquid perfluorocarbon liquids have been removed)
8 - Retinal massage with the back of the membrane peeler or back flush needle (only if required)
9 - Relaxing retinectomy (only if required)
10 - Inferior iridectomy
11 - Endophotocoagulation
12 - Liquid perfluorocarbon-silicone exchange with VFI (viscous fluid injection) unit

TABLE IV - SURGICAL PROCEDURES ON RECURRENT CASES

	Cases (%)
Membrane peeling	17 (100)
IOL explantation	4 (24)
Clear lens removal	3 (18)
Peripheric retinotomy (90-360 degrees)	9 (53)
Focal retinotomy (incarcerated retina)	2 (12)
Liquid PFC-silicone exchange	17 (100)
Subretinal membrane removal	3 (18)

The anterior PVR rate, which is 22% in primary PVR, rises to 85-100% in recurrences (4). Anterior PVR appeared to be clinically inherent (in all our patients so the first step in recurrent retinal detachment cases was to improve the anterior PVR. The best anatomical and functional results are obtained by dissection of the anterior membranes. To do this dissection properly, it was generally necessary to remove the crystalline lens and posterior-chamber intraocular lenses. It is better to “sacrifice” a clear lens in eyes with anterior PVR than to leave the lens in place and “sacrifice” the whole eye.

Of our patients who developed recurrences, four were aphakic and three pseudophakic. The crystalline or posterior chamber intraocular lenses were removed from all these patients, and the posterior capsule was completely removed. In those with poor pupillary dilatation iris retractors were used. With good illumination and visualising systems, adequate pupillary opening makes anterior membrane dissections easy.

If retinal relaxation is not accomplished even after removal of all the membranes, retinal massage should be done, with blunt-tipped tools. Should this have no effect, then it is time to try relaxing retinotomy (7-9), after checking before either retinotomy or retinectomy, that all epiretinal membranes have been removed. Relaxing retinotomy was applied in 52% of our patients. This procedure is more commonly needed in eyes with recurrent PVR. Having to do a relaxing retinotomy reduces the likelihood of a good anatomical and visual result. Of the nine patients who had retinotomy in our examination group, the retina remained attached in six (66%). Only 22% attained a visual level of 0.05.

The formation of subretinal membranes also affects the visual prognosis negatively. With their removal, functional visual prognosis drops as low as 20% (6). The removal of subretinal or epiretinal membranes preventing retinal attachment was necessary in three of our patients (17%).

Of the patients with recurrent detachment, five

had perforating eye traumas and they therefore formed the group with the worst anatomical and visual results.

Silicone oil, as an intravitreal tamponade, was administered to all patients in whom retinal attachment was achieved during operation. Apart from serving as intravitreal tamponade, silicone oil is a temporary stabiliser and a preventive substance against phthysis and hypotony, and should therefore be given to patients whose eyes have been operated several times and tend to hypotony (4, 12-16). Two of the patients (30%) developed detachment after the removal of silicone oil.

In conclusion, recurrent retinal detachment is one of the most troublesome events in vitreoretinal surgery and these patients unfortunately obtain the worst results with regard to visual improvements. Anatomical success depends, to a certain extent, on doing only one, radical operation on the pathology that leads to recurrence. This, we consider, will

TABLE V - INTRA AND POSTOPERATIVE COMPLICATIONS

Intraoperative complications	Cases	Postoperative complications	Cases
Iatrogenic tear	3	Hypotony	2
Vitreous hemorrhage	3	Detachment recurrence	4
Myosis	5	Phthysis bulbi	2
Corneal edema	7	Anterior chamber silicone	2
Subretinal PFC	2	Inferior iridectomy obstruction	3
Iris bite	1	Macular pucker	2
Iris hemorrhage	2	Macular ectopia	1
		Retained liquid PFC	2
		Fibrinoid pupillary membrane	2
		Silicone keratopathy	1

TABLE VI - SUCCESS RATE OF THE REOPERATIONS ACCORDING TO THE ETIOLOGY

Etiology	Anatomical success	Anatomical failure
Cicatricial	0 (0%)	1 (100%)
Perforating	2 (40%)	3 (60%)
PVR	5 (55%)	4 (45%)
Giant tear	1 (100%)	0 (0%)
Posterior pole tear	1 (100%)	0 (0%)

TABLE VII - PRE AND POSTOPERATIVE VISUAL ACUITIES OF THE PATIENTS WITH RECURRENT COMPLICATED RETINAL DETACHMENT

Visual acuity	LP-	LP+ - HM	HM-CF 1m	CF 1-5 m	>0.1
Preoperative	–	14	2	1	–
Postoperative	2	6	3	6	–

LP: light perception HM: hand motions CF: counting fingers m: meter

cause the least damage. The more operations are needed, the worse are the odds for anatomical success, and the more complicated the operations, the worse the visual results. Despite all these unfavourable points, the restoration of functional visual ability and prevention of phthysis bulbi in some patients is a reward for all those meticulous efforts.

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