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The management of giant retinal tears with silicone oil

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PURPOSE. *To report the surgical success of vitrectomy with silicone oil tamponade in the treatment of retinal detachment associated with giant retinal tears due to various factors.*

METHODS. *We retrospectively evaluated 21 eyes of 21 patients with retinal tears 90° or greater that underwent vitrectomy, with injection of perfluorocarbon liquids and silicone oil tamponade. Eight eyes (38.1%) had previous ocular surgery (4 aphakia-pseudophakia, 4 pars plana vitrectomy), 4 eyes (19.0%) had a history of trauma (blunt injuries in 2 and penetrating injury in 2), 3 (14.3%) had high myopia. Six eyes (28.6%) had no known condition predisposing to development of giant retinal tear.*

RESULTS. *Retinal attachment was obtained in 17 (80.5%) of 21 eyes, with a mean follow-up of 12.5 months. Visual acuity improved in 15 eyes (71.4%).*

CONCLUSIONS. *Pars plana vitrectomy with silicone oil tamponade proved highly effective in giant retinal tears in terms of anatomical and functional results. (Eur J Ophthalmol 2003; 13: 192-5)*

KEY WORDS. *Giant retinal tear, Proliferative vitreoretinopathy, Retinal detachment, Silicone oil*

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INTRODUCTION

Giant retinal tears (GRT) are retinal breaks that extend 90° or more in circumference. They tend to occur more commonly in males and are often associated with high myopia and trauma. High-grade proliferative vitreoretinopathy (PVR) develops in 40-50% of patients and complicates their treatment (1-5).

Modern surgical techniques have result in better intraoperative management of the retina and the GRT. The use of perfluorocarbon liquids has made it easier to manipulate the retina in eyes with GRT. Retinal tamponade with long-acting gas or silicone oil is a common approach in these cases (3, 6-8).

This study reports the results in 21 consecutive cases of GRT treated by pars plana vitrectomy and silicone oil tamponade.

METHODS

Twenty-one eyes of 21 consecutive patients with retinal detachment secondary to retinal tears 90° or more in circumference were operated at Ankara Training and Research Hospital between January 1995 and November 2000, and were followed for at least six months. Patients' main preoperative characteristics are listed in Table I.

Ages ranged from 11 to 73 years with a mean of 33.5 years. Eight (38.1%) had had previous ocular surgery, 4 had a history of trauma, three had high myopia (>5 D). No condition predisposing to development of GRT was known in 6 eyes (28.6%). Preoperative visual acuity ranged from 20/40 to light perception (Tab. I).

Fourteen eyes (66.7%) had GRT between 90° and 180°, 7 eyes (33.3%) had tears greater than 180° in

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circumference. At initial examination 12 eyes (57.1%) had PVR grade C and one had PVR D3 (4.8%). Posterior vitreous detachment was present in 18 patients.

All surgeries were performed by one surgeon (MA). Surgery included a complete three-port pars plana vitrectomy followed, as needed, by membrane dissection or relaxing retinotomy. Perfluorocarbon liquid (perfluorodecalin, DK-Line®) was then injected through a needle over the optic nerve to flatten the retina. Subretinal fluid was pushed from behind forwards and out through the giant tear. When the retina was flat and apposed to the underlying retinal pigment epithelium, endophotocoagulation or cryopexy or both were done to seal the edge of the flap. The perfluorocarbon liquid was removed from the eye by a flute needle during silicone oil-perflourocarbon liquid exchange. In all eyes 1000 centistokes (cs) silicone oil was used. An encircling buckle was placed in 17 eyes (80.9%) in the primary procedure. In the 16 eyes that were phakic at the time of surgery lensectomy was deemed necessary in five (31.3%) to achieve adequate dissection of the vitreous base.

TABLE I - PATIENTS' MAIN PREOPERATIVE CHARACTERISTICS

Demographic data	No.	%
Eye		
OD	10	47.6
OS	11	52.4
Sex		
Male	17	80.9
Female	4	19.1
Predisposing condition		
High myopia (≥ 6D)	3	14.3
Previous ocular surgery		
Cataract	4	19.1
Pars plana vitrectomy	4	19.1
Trauma		
Blunt	2	9.5
Penetrating	2	9.5
Extent of giant tear		
90-180°	14	66.7
>180-270°	7	33.3
Lens status		
Phakic	16	76.2
Pseudophakic	3	14.3
Aphakic	1	4.7
Dislocated	1	4.7

After surgery, patients were examined at 1 day, 1 week, 1 month, 3 months and 6 months. Visual acuity, slit lamp examination, intraocular pressure, and dilated fundoscopic findings were recorded at each visit. The mean follow-up was 12.5 months, with the range of 6-36 months.

RESULTS

Intraoperative retinal attachment was accomplished in 20 of the 21 eyes (95.2%). In one eye (4.8%) with a history of vitrectomy and grade D3 PVR the retina could not be reattached intraoperatively; this eye underwent no further surgery.

Postoperatively, recurrent retinal detachment with PVR developed in four eyes (19.0%), requiring further surgical intervention. The three eyes with preoperative PVR were circumferentially buckled in the initial procedure. Five vitrectomies were done in these eyes. Three of the four retinas were successfully reattached in a second procedure.

Postoperative complications included cataract formation in 7 (63.6%) of the 11 eyes that were left phakic, transient intraocular pressure elevation in 3 eyes (14.3%), macular pucker in 2 eyes (9.5%), and corneal decompensation in 1 eye (4.7%).

In all eyes the silicone oil was removed within 3-18 months (average 8.2 months). In three, silicone oil removal was combined with phacoemulsification and intraocular lens implantation. The retina redetached after removal of the silicone oil in 3 eyes. Two of these retinas were reattached with a second vitrectomy and C_3F_8 gas injection; the other patient refused further treatment. In this series, retinas were attached in 17 (80.9%) of 21 eyes at the last follow-up examination.

Visual acuity improved in 15 eyes (71.4%) and deteriorated in 3 (14.3%) (Fig. 1). Final visual acuity was equal to or better than 20/200 in 7 eyes (33.3%).

DISCUSSION

Newly developed vitreous surgical techniques combined with traditional scleral buckling procedures have gradually improved both functional and anatomical success rates in eyes with retinal detachment and GRTs

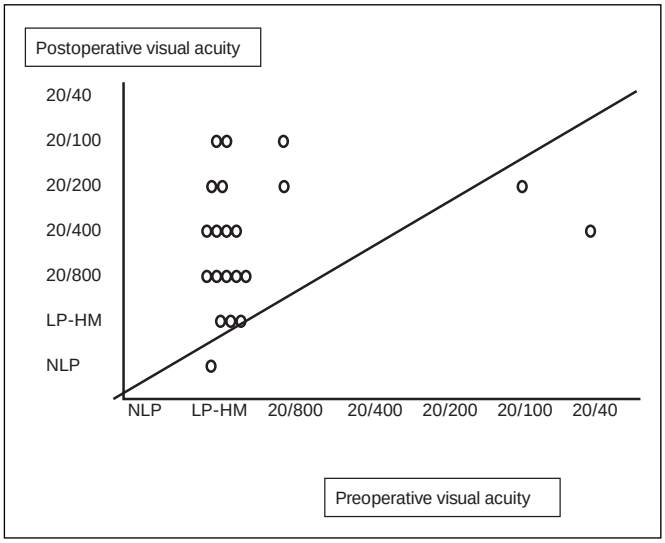

Fig. 1 - *Snellen visual acuity before and after treatment in patients with giant retinal tears.*

(6). The use of perfluorocarbon liquids has simplified the treatment of this disorder, enabling the surgeon to flatten the detached retina with the patient in a supine position and permitting easier manipulation of the flap of the tear (3, 7-10). The use of a wide-angle view system enables the surgeon to visualize the overall status of the retina and precisely examine the borders of a GRT during the entire surgical procedure, allowing better manipulation of the flap and subsequent endolaser to the periphery (4). However, opinions differ considerably on the use of extended tamponade after removal of perfluorocarbon liquids. Both silicone oil and gas tamponade offer high rates of retinal reattachment but there may be differences in visual results or the incidence of perioperative and late complications. In Batman's (11) study, anatomical and functional outcomes were similar with silicone oil and C_3F_8 gas for the management of GRT with PVR. We believe that silicone oil has some advantages over gas injection. The prolonged internal tamponade prevents the posterior edge of the GRT slipping and changes the vector forces generated by periretinal membranes from perpendicular to tangential in cases of PVR (4, 5, 12, 13). The optical properties of silicone oil mean that both endolaser and postoperative photocoagulation can be applied with greater facility and safety than when a gas bubble is present.

Use of a scleral buckle in the management of GRT repair is also controversial. One argument for this approach is to support the area of retina that is still connected anteriorly at the ora serrata. Supporting the ends of the retinal tear may lower the risk of tension. Elimination of the counter-action of traction forces which tend to detach the retina is the key in the management of GRT. In the presence of PVR, most surgeons recommend applying a scleral buckle which allows easier access and visualization of the peripheral retina after surgery. The counter-action of tangential traction and support of the horns of a GRT provided by the buckle may reduce the risk of redetachment secondary to existing or new breaks (5, 6, 14). In cases with no preoperative evidence of PVR some suggest aggressive anterior vitreous base dissection without a scleral buckle (15, 16).

The disadvantages of buckling include a greater potential for posterior slippage, radial infolding, or fish-mouth configuration with subsequent redetachment, the need for increased ocular manipulation, postoperative choroidal detachment, anterior segment ischemia and refractive changes (15-18). In the series reported by Verstraeten et al (7), the reoperation rate was 14% for eyes that underwent scleral buckling with initial vitrectomy and 45% in eyes that did not have primary scleral buckling. In our series 17 of 21 eyes underwent primary buckling, and only three required additional surgery consisting of vitrectomy and membrane peeling. In the four eyes without primary scleral buckling two required additional surgery, i.e. scleral buckling, vitrectomy or both. If a scleral buckle is considered, it should be low or moderately high to prevent radial folding or slippage. Larger series are necessary to confirm or refute the benefits of scleral buckling.

Preservation of the lens whenever possible is a generally accepted principle of vitreoretinal surgery, because of obvious advantages in visual rehabilitation. In a series of 34 phakic eyes with GRT without PVR, Verstraeten et al (7) were able to reattach the retina without lensectomy in all eyes. When severe PVR is present a clear lens may have to be removed to allow vitreous base dissection. In our series pars plana lensectomy was performed in five of 16 phakic eyes. Of the 11 eyes whose lens was spared seven developed cataract in the follow-up period. The primary surgical goal of GRT repair is to reappose the retina in a single procedure and minimize the subsequent risk of recurrence. Lenticular status is secondary and the risk of post-vitrectomy cataract formation is high.

This is due to aggressive vitrectomy and prolonged silicone oil tamponade.

In this series our intraoperative retinal reattachment rate was 95.2% and the overall reattachment rate was 80.9% at the last follow-up; 71.4% of patients had improved visual acuity. These results compare favorably with other series (2-8, 10). Redetachment rates of 8-30% after silicone oil (4, 12, 19) and 10-14% after gas tamponade (6, 7, 10) have been reported in patients with GRT. In our study causes of recurrence were PVR in four patients and inadequate retinopexy in two, in whom the retina was redetached after removal of the silicone oil.

For surgical treatment of GRT with PVR, we advocate a technique combining vitrectomy, scleral buckling, perfluorocarbon liquid and perfluorocarbon-silicone oil exchange as a primary procedure to flatten the retina. Our anatomic and visual results compare favorably with other published series.

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