

Radical vitrectomy and silicone-oil injection in the treatment of proliferative vitreoretinopathy following retinal detachment

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Abstract. Eighteen consecutive patients with proliferative vitreoretinopathy following retinal detachment were treated with radical pars-plana vitrectomy and silicone oil injection.

At least 6 months follow-up demonstrated fully attached retinas in 12 patients, partly attached retinas in 3 patients and primary failure in 3 patients.

The visual fields revealed serious defects in 50% of those patients with attached retinas.

The expected complications such as cataract (100%), glaucoma, corneal decompensation and subretinal oil were seen as well, but the complication rate is expected to diminish with newer surgical techniques.

Introduction

Radical pars-plana vitrectomy and silicone-oil injection has been advocated in Europe by Scott [1] and Živojnović, [2] amongst others, 3–10 for the treatment of proliferative vitreoretinopathy following rhegmatogenous retinal detachment.

Because disagreement remains about the proper role of silicone oil, a multicenter, prospective, controlled clinical study has been set up in America [11].

The purpose of this study is to report on the indications, results and complications in 18 consecutive patients referred from one clinic in Amsterdam (J.S. and R.K.) to the vitreoretinal department in Rotterdam (R.Z.).

Patients and methods

Proliferative vitreoretinopathy developed in 22 out of 277 retinal detachment patients operated on during the period from September 1982 to August 1985.

Retinal detachment surgery consisted of a 2 mm encircling band, usually radial silastic sponges, external cryocoagulation around the retinal defects under binocular ophthalmoscopic control, exodrainage of subretinal fluid. Mobilisation was complete within 3–4 days.

Hypotony at the end of the operation was relieved with either a gas/air mixture or Healon. When this procedure failed to produce attachment of the retina, the proliferative vitreoretinopathy was classified according to

Table 1. Patients' data before vitrectomy and silicone oil injection.*

Patient	Age	Number of retinal operations	Visual acuity	PVR classification	Miscellaneous
1	29	1x	CF	C-2	—
2	25	0	CF	C-2	trauma, ECCE, giant tear
3	79	1x	CF	?	ICCE, vitreous loss
4	56	2x	HM	D-1	second eye
5	67	2x	HM	C-2	ICCE, vitreous hemorrhage
6	64	1x	HM	C-3	ECCE
7	45	1x	HM	C-2	Myopia S-12.0
8	74	3x	HM	D-3	ICCE, vitreous loss
9	65	2x	HM	C-3	—
10	65	2x	HM	C-2	ECCE + IOL
11	65	2x	CF	C-1	vitreous hemorrhage
12	70	1x	HM	D-2	ICCE
13	60	2x	HM	C-1	ECCE + IOL
14	47	3x	HM	C-3	ECCE + IOL
15	63	3x	CF	C-1	ECCE second eye
16	10	0	HM	D-2	ECCE, giant tear
17	42	1x	HM	D-3	vitreous hemorrhage myopia S-12.0
18	59	2x	HM	C-1	8 retinal tears

* Under visual acuity: HM indicates hand movements; CF indicates counting fingers; PVR indicates proliferative vitreoretinopathy classification according to Retina Society [12]. ECCE indicates extracapsular cataract extraction. ICCE indicates intracapsular cataract extraction.

the criteria of the Retinal Society [12] and patients were informed about possible treatment by radical pars-plana vitrectomy and silicone-oil injection. Four out of 22 candidates refused further treatment, so 18 were left for follow-up. Further surgery was performed by Živojnović and his team, and consisted basically of radical pars-plana vitrectomy, membranectomy, endodrainage of subretinal fluid, exo- or endo-cryocoagulations and silicone oil injection with a mechanical pressure unit under microscopic control.

During the study newer techniques, such as retinectomy, retinal tags, and six o'clock peripheral iridectomy [13] were introduced. The purpose of the 6 o'clock iridectomy in aphakics was to prevent corneal decompensation [14]. External drainage was not practised [15].

Removal of the silicone oil was aimed at after 6–12 months, depending on the severity of complications. Outpatient follow up was carried out both by the vitreoretinal department (R.Z.) and the referring clinic (J.S. and R.K.), and consisted of visual acuity, tonometry, biomicroscopy of the vitreous and retina with the three-mirror contactlens and panfunduscope, and visual field testing with the Goldmann perimeter. The minimum follow-up was 6 months.

Eighteen persons were included in the study, 12 males and 6 females. The average age was 55 years, with 10 years as minimum and 81 as

Table 2. Patients' data following pars-plana vitrectomy and silicone oil injection.*

Patient	Number vitrectomy + silicone oil	Retinal result	Visual acuity	Visual field	Silicone oil removal	Follow-up	Complications
1	1x	attached	0.1	III	no	36M	cataract, angle closure, ECCE
2	1x	attached	0.5	I	yes	34M	none
3	2x	attached	0.3	I	yes	12M	corneal dystrophy, wound dehiscence, PKP
4	1x	detached	LP	no	no	26M	cataract, subretinal oil
5	1x	attached	CF	I	no	24M	none
6	1x	attached	0.25	I	yes	17M	recurrent detachment
7	2x	attached	CF	III	no	8M	cataract (ICCE), optic atrophy
8	1x	attached	0	?	no	6M	neglected glaucoma
9	1x	unknown	CF	?	no	14M	mature cataract
10	1x	partly att.	CF	II	no	12M	none
11	1x	partly att.	CF	?	no	12M	cataract, ICCE
12	1x	detached	LP	no	no	9M	failure, subretinal oil
13	1x	unknown	HM	III	no	9M	corneal dystrophy
14	2x	attached	0.16	II	yes	6M	glaucoma (iridectomy)
15	2x	attached	CF	III	no	6M	none
16	3x	attached	0.1	?	no	6M	reproliferation (giant tear)
17	1x	detached	LP	no	no	6M	contracted retina, cataract
18	3x	partly att.	CF	III	yes	6M	recurrent detachment, cataract (ICCE)

* Under visual acuity: LP indicates light perception; HM indicates hand movements; CF indicates counting fingers. The visual field is graded in I = fairly good; II = moderate defects; III = severe defects.

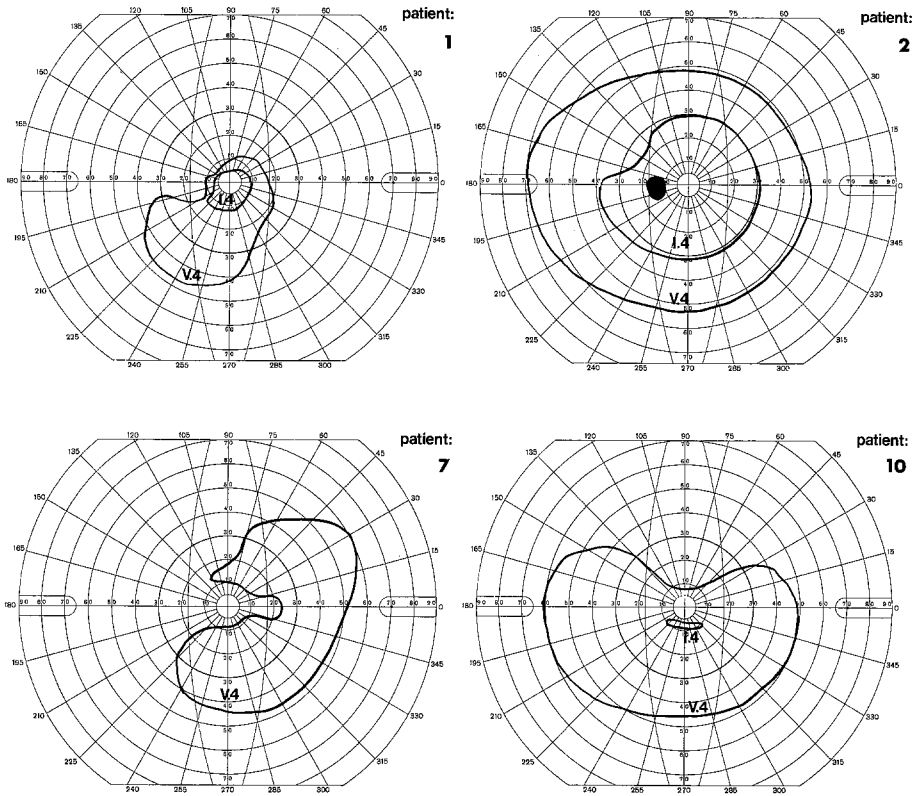


Figure 1. Visual fields of 8 patients with moderate (10 and 14) and severe (1, 7, 13, 15, 18) visual field defects, following pars-plana vitrectomy and silicone oil.

Patient 2 is an example of a fairly good visual field.

maximum age. Two patients were considered to be monocus patients, having a visual acuity of less than 0.1 in the other eye.

Prior to pars-plana vitrectomy and silicone oil injection, the lens was present in 7 patients; 8 patients were aphakic (at least 4 out of 8 had vitreous problems) and 3 were pseudophakic. A giant retinal tear was present in 2 patients.

Results

Table 1 lists the patients in chronological order with their age, number of external retinal detachment operations, resulting visual acuity and the classification of the proliferative vitreoretinopathy.

Except for patients 8 and 17, all patients were operated on within 1–3 weeks after the diagnosis of proliferative vitreoretinopathy was made.

Table 2 lists the same 18 patients after pars-plana vitrectomy and silicone oil injection, together with their retinal status, visual acuity,

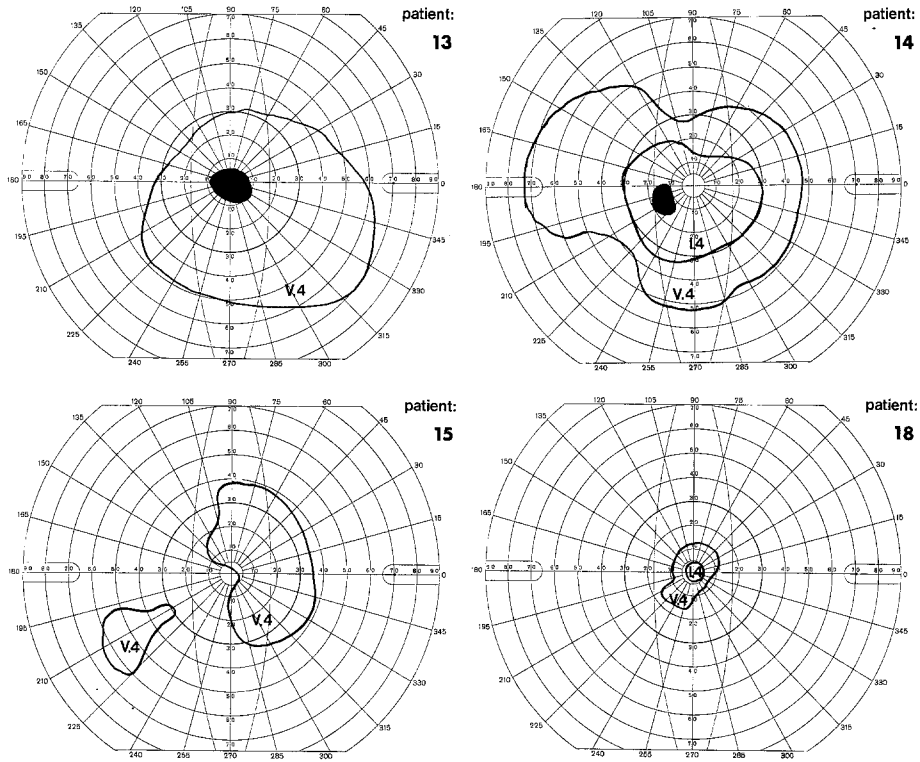


Figure 1.

grading of the visual field, whether or not silicone oil was removed, follow-up and complications.

Complete retinal reattachment was achieved in 10 out of 18 patients (55%). In two patients (no. 9 and 13) funduscopy was impossible, but the retina seemed to be attached after the silicone oil injection according to ultrasound examination (reattachment rate 67%).

Three patients had a partly detached retina in the periphery, which was considered to be stationary and not requiring reoperation yet. Three patients were failures after the first operation, on account of retinal contraction, or retinal tears in the posterior pole and/or subretinal silicone oil.

An attached retina is however not the same as a good visual result. The most rewarding result was obtained in patient no. 2 who, with a giant tear following trauma, obtained 0.5 vision with an aphakic contactlens. An unfortunate example is patient no. 8, where a remarkable anatomical success was achieved after 6 years of retinal detachment, classified as D3. The immediate postoperative visual result, however, was the same as

before operation (handmovements). The patient did not return for early follow-up, but six months later the eye had become blind, probably because of an intraocular pressure of between 30 mm Hg and 40 mm Hg.

The visual field defects were not easy to classify and are given in Figure 1. Severe visual defects were present in 50% of the patients with completely attached retinas (patients 1, 7, 13, 15, 18). Patient 15 (monoculus), however, with severe visual field defects, is reading again with TV-loupe magnification.

Complications

Primary failure to reattach the retina was seen in 3 patients (4, 12, 17), who were all graded as D1 or D3. It should be noted however that there was a time-interval of 1 to 3 weeks between the grading and the pars-plana vitrectomy and silicone oil injection.

Cataract developed in all cases within one year following pars-plana vitrectomy and silicone oil injection. In three patients (7, 11, 18) cataract extraction was combined with silicone oil removal or silicone oil injection, in order to limit the number of operations and to obtain a good fundus view. One patient (1) developed lens-swelling and subsequent angle-closure glaucoma, necessitating immediate extracapsular cataract extraction. One Patient (9) has a mature cataract waiting for surgery.

Two patients (4, 17) were primary failures so that the cataract was not removed.

Intra-ocular pressures of 21 mm Hg or higher were seen in 5 patients, two of them (1 and 14) were treated surgically, by iridectomy or cataract extraction, the remaining three are under control with Timolol 0.5% eyedrops twice daily.

Severe corneal decompensation was seen in three patients (3, 4 and 13), requiring silicone oil removal in one and penetrating keratoplasty in another.

A recurrent retinal detachment following silicone oil removal was seen in 2 out of 5 patients. The silicone oil was removed after between 5 and 18 months follow-up. One patient with a recurrent retinal detachment was treated successfully with silicone oil injection again, the other patient refused further silicone surgery, realising that it would implicate at least two more operations. He consented to retinal detachment surgery with Healon, resulting in an attached retina for more than 6 months with a visual acuity of 0.25 (patient 6).

Transient psychological depression occurred in two patients who had good visual acuity in the fellow eye. Both patients found it difficult to accept the visual outcome in relation to the amount of surgery and time spent, despite the fact that they were properly informed beforehand.

Discussion

In this limited but consecutive series, pars-plana vitrectomy and silicone oil injection proved to be successful where conventional retinal detachment surgery had failed. Complete reattachment was achieved in at least 67% of cases, although severe visual defects were present in 50% of these cases. Comparison with other series is far from easy, because of variable indications and techniques. In addition, the classification of retinal detachment with proliferative vitreoretinopathy [12] does not take into account the presence of subretinal strands, mobility of the retina, shrinkage of the retina, and many other conditions which are only found at the time of surgery. For assessment and comparison the classification of proliferative vitreoretinopathy by the Retina Society probably needs extension and specification.

All the expected complications such as cataract (100%), glaucoma, corneal decompensation, subretinal oil and redetachment following silicone oil removal, were seen in this series.

During the course of this study, however, the complication rate has been reduced steadily by introducing new techniques, such as the 6 o'clock peripheral iridectomy in aphakic eyes. Simultaneous removal of the lens, either clear or cataractous, is now under consideration, in order to maintain a clear fundus view in the first postoperative year and to reduce the number of operations. In older patients, the phako-emulsification technique might be advantageous, although this may adversely affect pupillary dilatation.

Redetachment following silicone oil removal was seen in 40% of cases in this series, but only in 12% by Ando [3]. Prevention of redetachment after silicone oil removal might be attempted by delaying the silicone oil removal and by prophylactic Argon laser photocoagulation.

In giant tears (patients 2 and 16) silicone oil proved to be very helpful in attaching the retina. The surgery time with silicone oil is much shorter than with gas techniques with the patient inverted.

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