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# Selective laser trabeculoplasty in silicone oil-induced glaucoma

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## Abstract

### Introduction

One of the complications of using silicone oil is glaucoma. Selective laser trabeculoplasty (SLT) became an increasingly focused laser procedure for glaucoma because of its efficacy and minimal destructive effects on the surrounding tissues. The aim of our study is to analyze the efficacy of SLT on silicone oil-induced secondary glaucoma in terms of intraocular pressure (IOP).

### Patients and methods

This is prospective study on 30 eyes of 30 patients with silicone oil-induced secondary glaucoma. The patients should have had no history of glaucoma or ocular hypertension before silicone oil injection. The patients were treated with laser at 360° of the trabecular meshwork using Smart Selecta Duet Lumenis SLT, Germany.

### Results

The baseline IOP ranged between 22 and 28 mmHg, with a mean IOP of  $25 \pm 2.0$  mmHg. The IOP on the first day ranged between 20 and 26 mmHg, with a mean of  $23 \pm 1.5$  mmHg. At first month, the range of IOP was 12–24 mmHg, with a mean of  $18 \pm 3$  mmHg. At 3 months, it was 10–18 mmHg, with mean of  $14 \pm 3.8$  mmHg. At 6 months, it was 11–20 mmHg, with a mean of  $15 \pm 4.2$  mmHg ( $P = 0.01, 0.002, 0.003,$  and  $0.004,$  respectively).

### Conclusion

Our study suggested effectiveness of SLT in lowering the IOP in siliconized eyes with secondary glaucoma, and it is a safe procedure with no serious complications.

**Keywords:** Selective Laser Trabeculoplasty, Silicone oil induced glaucoma, SLT

## INTRODUCTION

Silicone gel is an important adjunct in surgical treatment of retinal detachment as it is used as an endotamponade [1].

One of the complications of using silicone oil is glaucoma, and its incidence is difficult to ascertain. Some studies reported the rate of glaucoma from 2.2% in 6 months to 56% in 8 months [2,3]. Other studies reported incidence from 11 to 50% [4].

Many mechanisms of silicone oil-induced glaucoma include pupillary block, migration of emulsified and nonemulsified silicone oil to the anterior chamber blocking the trabecular meshwork, and inflammation inducing synechial angle closure [3,5,6].

Selective laser trabeculoplasty (SLT) became an increasingly focused laser procedure for glaucoma because of its efficacy and minimal destructive effects on the surrounding tissues [7].

SLT has also shown to be effective as primary treatment and adjunct to medical therapy [8].

## Aim

The aim was to analyze the efficacy of SLT on silicone oil-induced secondary glaucoma in terms of intraocular pressure (IOP).

## PATIENTS AND METHODS

This is prospective study on 30 eyes of 30 patients with silicone oil-induced secondary glaucoma.

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We considered patients who cannot tolerate any topical antiglaucoma medications or who are not compliant with medical therapy.

The patients should have had no history of glaucoma or ocular hypertension before silicone oil injection and at least 1 month with normal anterior chamber and anterior chamber angle on gonioscopy.

We excluded patients with advanced field defects, previous glaucoma surgery, corneal disease that can interfere with accurate applanation measurements, patients on systemic steroids, or those who have uveitic glaucoma.

The patients in this study were selected from patients undergoing retinal surgery with silicone oil injection.

Immediately before the laser procedure, single application of proparacaine hydrochloride 0.5% was instilled into the eye.

Then the patients were treated with laser at Smart Selecta Duet Lumenis SLT, Dreieich, Germany 360° of the trabecular meshwork using Smart Selecta Duet Lumenis SLT (Germany).

The laser energy was initially set at 0.5 mJ and increased gradually by 0.1 mJ increment until bubble formation occurred.

The treatment was continued on the minimal energy level for bubble formation. The entire meshwork was treated with 90–100 spots.

Postoperatively, the patients were treated with fluorometholone 0.1%, and the same antiglaucoma medications used before treatment to avoid any IOP spikes.

The patients were followed up for 6 months after treatment at 1 day after treatment, as well as 1, 3, and 6 months after laser.

Postoperative examination included best-corrected visual acuity using Snellen's chart, Goldmann's applanation tonometry, slit-lamp biomicroscopy, and indirect ophthalmoscopy fundus examination.

Data were presented in terms of parametric data. Parametric data were analyzed with analysis of variance and whenever appropriate with Student t test.

All *P* values less than 0.05 were considered statistically significant.

All statistical calculations were done using computer programs statistical package for social science (SPSS Inc., Chicago, Illinois, USA), version 18 for Microsoft Windows.

The study followed the ethical values in collecting data, data analysis, and in keeping honesty. Informed consent was taken from the patients. All identifiable information about patients' health status, medical condition, diagnosis, prognosis, treatment, and all other information of personal kind will be kept confidential.

## RESULTS

We analyzed the results of SLT in 30 eyes of 30 patients.

The mean age of the patients was 55 years. Overall, 21 patients were males and nine patients were females.

The underlying pathology that leads to vitreoretinal surgery

with silicone oil injection was as follows:

- (1) Twelve eyes with rhegmatogenous retinal detachment.
- (2) Eight eyes with rhegmatogenous retinal detachment with proliferative vitreoretinopathy.
- (3) Six eyes with vitreous hemorrhage with proliferative vitreoretinopathy.
- (4) Four eyes with tractional retinal detachment and proliferative diabetic retinopathy.

All eyes had undergone pars-plana vitrectomy with silicone oil injection (22 eyes with silicone oil 5000 Centistoke and eight eyes with silicone oil 1000 Centistoke).

Among the 30 patients, five patients were not on any medical treatment, 18 patients were on one medical treatment (carbonic anhydrase inhibitor), seven patients were on combination of carbonic anhydrase inhibitor and beta-blocker.

A total of 23 patients were phakic and seven patients were aphakic.

The laser energy used in the treatment were 0.5–0.7 mJ applied in 90–100 spots, including 180–360° of the angle of anterior chamber (Fig. 1 and Table 1).

The baseline IOP ranged between 22 and 28 mmHg, with a mean IOP of  $25 \pm 2.0$  mmHg.

The IOP at the first day ranged between 20 and 26 mmHg, with a mean of  $23 \pm 1.5$  mmHg.

At first month, the range of IOP was 12–24 mmHg, with a mean of  $18 \pm 3$  mmHg.

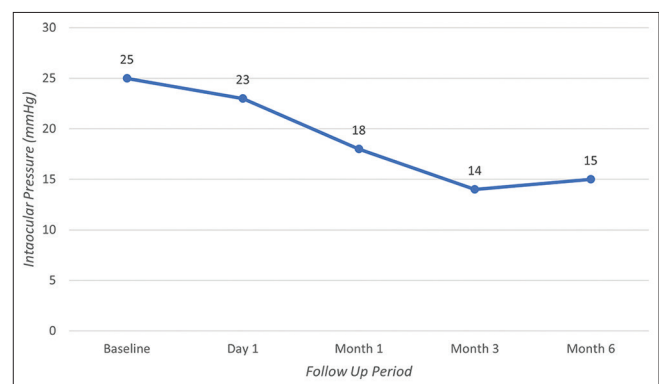
At 3 months, it was 10–18 mmHg, with a mean of  $14 \pm 3.8$  mmHg.

At 6 months, it was 11–20 mmHg, with a mean of  $15 \pm 4.2$  mmHg (*P* = 0.01, 0.002, 0.003, and 0.004, respectively).

No spikes were detected after SLT.

## DISCUSSION

Known complication of usage of silicone oil injection in case of vitrectomy is secondary glaucoma, which occurs postoperatively [1].



**Figure 1:** The course of mean IOP during the follow-up period. IOP, intraocular pressure.

**Table 1: Patients' characteristics**

Number of eyes	30
Mean age (years)	55
Male	21
Female	9
Pathology causing surgery	
Rhegmatogenous RD	12
Rhegmatogenous RD+PDR	8
Vitreous hemorrhage+PDR	6
Tractional RD+PDR	4
Lens status	
Phakic	23
Aphakic	7
Pre SLT Snellen BCVA	
>20/200	16
<20/200 CF	10
HM	4
Number of antiglaucoma topical treatment before SLT	
1 Medication	18
2 Medications	7
Not treated	5
Type of silicone oil used	
1000 Centistoke	8
5000 Centistoke	22
SLT parameters	
Number of laser spots	90-100
Degree of angle treated	180-360

BCVA, best-collected visual acuity; CF, counting fingers; HM, hand movement; PDR, proliferative diabetic retinopathy; RD, retinal detachment; SLT, selective laser trabeculoplasty.

Some studies showed incidence of secondary glaucoma in siliconized eyes of 11–48% [5,9,10]. Surgical treatments with conventional filtration surgery had limited role owing to conjunctival scarring and obstruction by silicone oil [4].

The mechanisms of increased IOP in siliconized eyes include excessive silicone injection, inflammation which can lead to synechial angle closure, and rubeosis iridis (these causes were not included in our study).

Open-angle glaucoma with obstruction of trabecular meshwork and Schlemm's canal by migrated emulsified or nonemulsified silicone is the main cause of glaucoma [11,12]. This is confirmed by pathological examination, which proved that emulsified silicone drops or loaded macrophage can block the trabecular meshwork that leads to elevated IOP [13].

In our study, we chose cases with open-angle secondary glaucoma as detected with angle examination (Gonioscopy).

These patients whether on medical treatment (one or two medications) or not on medical treatment were treated with SLT, which induced significant reduction of IOP during the follow-up 6-month duration.

SLT induces reduction of IOP through the release of cytokines and chemotactic factors, which increase and upregulate macrophages in the trabecular meshwork [14].

Moreover, they increase the permeability of Schlemm's canal cells [15].

In our study, there were no serious complications in using of SLT.

We have some limitations in our study, such as limited number of cases and follow-up duration.

## CONCLUSION

In conclusion, our study suggested effectiveness of SLT in lowering the IOP in siliconized eyes with secondary glaucoma, and it is a safe procedure, with no serious complications.

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Nil.

## Conflicts of interest

There are no conflicts of interest.

## REFERENCES

- Zborowski-Gutman L, Treister G, Naveh N, Chen V, Blumenthal M. Acute glaucoma following vitrectomy and silicone oil injection. *Br J Ophthalmol* 1987; 71:903–906.
- Unosson K, Stenkula S, Törnqvist P, Weijdegård L. Liquid silicone in the treatment of retinal detachment. *Acta Ophthalmol (Copenh)* 1985; 63:656–660.
- de Corral LR, Cohen SB, Peyman GA. Effect of intravitreal silicone oil on intraocular pressure. *Ophthalmic Surg* 1987; 18:446–449.
- Al-Jazzaf AM, Netland PA, Charles S. Incidence and management of elevated intraocular pressure after silicone oil injection. *J Glaucoma* 2005; 14:40–46.
- Barr CC, Lai MY, Lean JS, Linton KL, Trese M, Abrams G, Silicone Study Group. Postoperative intraocular pressure abnormalities in the silicone study: silicone study report 4. *Ophthalmology* 1993; 100:1629–1635.
- Henderer JD, Budenz DL, Flynn HW, Schiffman JC, Feuer WJ, Murray TG. Elevated intraocular pressure and hypotony following silicone oil retinal tamponade for complex retinal detachment: incidence and risk factors. *Arch Ophthalmol* 1999; 117:189–195.
- Latina MA, Sibayan SA, Shin DH, Noecker RJ, Marcellino G. Q-switched 532-nm Nd: YAG laser trabeculoplasty (selective laser trabeculoplasty): a multicenter, pilot, clinical study. *Ophthalmology* 1998; 105:2082–2090.
- Damji KF, Bovell AM, Hodge WG, Rock W, Shah K, Buhrmann R, Pan YI. Selective laser trabeculoplasty versus argon laser trabeculoplasty: results from a 1-year randomised clinical trial. *Br J Ophthalmol* 2006; 90:1490–1494.
- Nguyen QH, Lloyd MA, Heuer DK, Baerveldt G, Minckler DS, Lean JS, Liggett PE. Incidence and management of glaucoma after intravitreal silicone oil injection for complicated retinal detachments. *Ophthalmology* 1992; 99:1520–1526.
- Valone Jr J, McCarthy M. Emulsified anterior chamber silicone oil and glaucoma. *Ophthalmology* 1994; 101:1908–1912.
- Federman JL, Schubert HD. Complications associated with the use of silicone oil in 150 eyes after retina-vitreous surgery. *Ophthalmology* 1988; 95:870–876.
- Yeo JH, Glaser BM, Michels RG. Silicone oil in the treatment of complicated retinal detachments. *Ophthalmology* 1987; 94:1109–1113.
- Budde M, Cursiefen C, Holbach LM, Naumann GO. Silicone oil-associated optic nerve degeneration. *Am J Ophthalmol* 2001; 131:392–394.
- Alvarado JA, Alvarado RG, Yeh RF, Franse-Carman L, Marcellino GR, Brownstein MJ. A new insight into the cellular regulation of aqueous outflow: how trabecular meshwork endothelial cells drive a mechanism that regulates the permeability of Schlemm's canal endothelial cells. *Br J Ophthalmol* 2005; 89:1500–1505.
- Lee WR. The pathology of the outflow system in primary and secondary glaucoma. *Eye* 1995; 9:1–23.