



Effect of Corneal Thickness on Selective Laser Trabeculoplasty to Decrease Intraocular Pressure as Primary or Secondary Treatment of Glaucoma

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Introduction

- **Selective Laser Trabeculoplasty (SLT) uses a Q-Switched frequency-doubled (532 nm), low energy Nd:YAG laser, which targets melanocytes in the trabecular meshwork^{1,2}.**
- **SLT treatment induces a biologic response in the trabecular meshwork, which involves the release of cytokines that trigger macrophage recruitment and other changes, leading to reduction in intraocular pressure (IOP).**
- **SLT treats the trabecular meshwork without causing thermal nor coagulative damage to surrounding structures.**

1. Latina MA, et al. Selective targeting of trabecular meshwork cells: in vitro studies of pulsed and CW laser interactions. *Exp Eye Res.* 1995;60:359-372.

2. Latina MA, et al. Q-switched 532-nm Nd:YAG laser trabeculoplasty (selective laser trabeculoplasty): a multicenter, pilot, clinical study. *Ophthalmology.* 1998;105:2082-2090.



Purpose



- To examine the effect of Central Corneal Thickness (CCT), in thin, average, and thick corneas, to decrease IOP after treatment with SLT, as primary or secondary therapy, in patients with glaucoma.



Methods

- Retrospective chart review was performed on 96 eyes and 84 eyes, respectively, of those treated as primary or secondary therapy, from a continuous case series of 3034 eyes treated with SLT over 7.5 years.
- CCT measurement, as determined by ultrasonic pachymetry, was divided into three categories (thin: $<550 \mu\text{m}$, average: $550\text{-}600 \mu\text{m}$, and thick: $>600 \mu\text{m}$) for both primary and secondary groups.
- Six subgroups (primary & secondary SLT / thin, average, thick CCT) were established to examine the relationship between pre-op CCT value and post-op decrease in IOP.
- Two-tailed paired t-test was used to compare maximum pre- and average post-treatment IOP in each of the subgroups. ANOVA was used to compare relative drop in IOP among the three subgroups of CCT for each SLT treatment group.



Results: Primary

- Mean follow-up was 1227 days
- Thin corneas (<550 μm): Mean thickness 531 μm
 - Mean IOP decreased 31% from mean of 16.2 mmHg to 11.2 mmHg
- Average corneas (550-600 μm): Mean thickness 571 μm
 - Mean IOP decreased 32% from mean of 17.1 mmHg to 11.7 mmHg
- Thick corneas (>600 μm): Mean thickness 621 μm
 - Mean IOP decreased 29% from mean of 15.9 mmHg to 11.3 mmHg
- Results were significant with $p < 0.01$.



Results: Secondary

- Mean follow-up was 1139 days
- Thin corneas (<550 μm): Mean thickness 524 μm
 - Mean IOP decreased 18% from mean of 17.0 mmHg to 13.9 mmHg
- Average corneas (550-600 μm): Mean thickness 572 μm
 - Mean IOP decreased 23% from mean of 19.0 mmHg to 14.7 mmHg
- Thick corneas (>600 μm): Mean thickness 671 μm
 - Mean IOP decreased 26% from mean of 20.4 mmHg to 15.1 mmHg
- Results were significant with $p < 0.01$.



Results

Treatment Type	Corneal Thickness	Mean CCT	Sample Size (N)	Pre-op IOP	Post-op IOP	% Drop in IOP	P value
Primary	<550 μm	531	25	16.2	11.2	31%	<0.01
	550 -600 μm	571	50	17.1	11.7	32%	<0.01
	>600 μm	621	21	15.9	11.3	29%	<0.01
Secondary	<550 μm	524	31	17.0	13.9	18%	<0.01
	550-600 μm	572	32	19.0	14.7	23%	<0.01
	>600 μm	671	21	20.4	15.1	26%	<0.01

- T-test: Within each subgroup, results were significant for drop in IOP ($p < 0.01$)
- ANOVA: In both primary and secondary SLT groups, there was no significant difference for drop in IOP, among thin, average, and thick CCT subgroups



Discussion

- **The Glaucoma Laser Trial**
 - Established efficacy of laser trabeculoplasty in lowering IOP in previously untreated glaucoma patients¹.
- **The Ocular Hypertensive Treatment Study and**
- **Early Manifest Glaucoma Trial**
 - Established efficacy of early and effective treatment to preserve long-term visual function in glaucoma patients^{2,3}.
- **Our findings build on these studies and suggest SLT significantly lowered IOP in both primary SLT and secondary SLT treatment groups and similarly among thin, average, and thick CCT subgroups.**
- **Further study with controlled clinical trials is indicated.**

1. The GLT Research Group. GLT. *Ophthalmology*. 1990;97:1403-1413.

2. Kass MA, et al. OHTS. *Arch Ophthalmol*. 2002;120:701-713.

3. Heijl A, et al. EMGT. *Arch Ophthalmol*. 2002;120:1268-1279.



Conclusion

- In this series of over 3,000 eyes followed for more than 7 years:
 - Selective Laser Trabeculoplasty (SLT) as primary (initial) therapy significantly lowered intraocular pressure (IOP) in glaucoma patients with thin, average, thick central corneal thickness (CCT).
 - Selective Laser Trabeculoplasty (SLT) as secondary (adjunctive) therapy significantly lowered intraocular pressure (IOP) in glaucoma patients with thin, average, thick central corneal thickness (CCT).
 - There was NO significant effect of central corneal thickness (CCT) on selective laser trabeculoplasty (SLT), to decrease intraocular pressure in either primary SLT or secondary SLT treatment of glaucoma.
- Results were significant with $p < 0.01$.