

# SLT and Medical Therapy in Open-Angle Glaucoma: A Comparative Study

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## ABSTRACT

Glaucoma is a common ocular disorder and the second leading cause of irreversible blindness worldwide. Early diagnosis and prompt treatment are essential to prevent vision loss and blindness. The aim of this study was to evaluate and compare the safety and efficacy of medical treatment and selective laser trabeculoplasty (SLT) in patients with chronic primary open-angle glaucoma. Seventy patients (120 eyes) diagnosed with open-angle glaucoma were included in this study, conducted from June 2025 to January 2026. The patients were divided into two groups: a medical treatment group comprising 80 eyes and an SLT-treated group comprising 40 eyes. SLT achieved a greater reduction in intraocular pressure (IOP); however, the difference between the two groups was not statistically significant (WMD = 0.70; 95% CI: -0.22 to 1.38). No major adverse effects were observed in either group, although transient ocular inflammation was observed in some patients in the SLT group. Intraocular pressure was reduced in both the laser-treated and medically treated groups, with no significant difference between the two treatment modalities. SLT appears to be a safe and effective treatment option for open-angle glaucoma and may be used as an alternative to medical therapy. It may also provide economic and practical benefits by reducing patients' dependence on topical eye drops, potentially making it a more cost-effective treatment option.

**Keywords:** chronic open angle glaucoma, medical treatment, Selective laser Trabeculoplasty (SLT).

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## Introduction

Glaucoma is considered one of the most popular causes of loss of vision and blindness. In the posterior chamber of the eye the aqueous humor is formed by ciliary body regularly and then drained into the anterior chamber. In cases of Primary open-angle glaucoma the angle between the cornea and the iris is opened but there is decrease in the rate of drainage of aqueous solution in the trabecular meshwork. As a result, the intraocular pressure gradually increases, leading to optic nerve damage and progressive visual loss. (1,2)

The main the goal of OAG treatment is to lower the intraocular pressure (IOP). Currently, there are three known types of treatment used to achieve this goal: eye drops, laser treatments and incisional surgery. (3) Eye drops used topically to decrease intraocular pressure usually used as the first line of treatment. However, they have many side effects, which can be local or systemic. With difficulties such as, cost and difficulty to use eye drops. Therefore, an alternative therapy as SLT that minimizes these side effects was needed. (4)

Selective laser trabeculoplasty is a new type of laser, its frequency is 532 nm used in management of open angle glaucoma. It is designed to specifically act on pigmented cells so it mainly affects the trabecular meshwork without any Side effects or thermal abnormality to the anterior chamber or any nonpigmented cells. (5)

Initially Laser Trabeculoplasty described as an adjuvant therapy for patients using topical hypotensive medications, usually used as the last alternative before surgery in unresponsive cases. Recent advances in laser field, most clinical studies focused on Laser Trabeculoplasty that can be used as an initial treatment with encouraging results. But incisional surgery can be used as a last option if topical and Laser treatment failed in lowering intraocular pressure. (6,7)

## Aim of the work

In this study our aim is to make a comparison between Selective Laser Trabeculoplasty and medical treatment in the form of eye drops used topically in groups of patients of open angle glaucoma and

studying their effectiveness and their effect on the quality of life.

### Ethics

This study is done from June 2025 to January 2026 with follow up for 6 months at least. All patients in this study gave their previous consents to be included in this study and also follow up

### Cases

We take seventy patients (120 eyes) in our work from June 2025 to January 2026. We select patients diagnosed as cases of open angle glaucoma and also used cases recently diagnosed we also exclude cases had any inflammation or any previous surgery in the eye we excluded also patients with neovascular diseases or closed angle glaucoma

Preoperative investigations as slit-lamp examination, Snellen visual acuity, IOP measurement, gonioscopy, and evaluation of cup: disc ratio was done. We take intraocular pressure reading three times and take average of these reading before application of laser by three weeks. All patients confirmed to have open angle glaucoma undergo visual field examination.

After that, we divided the patients into 2 groups:

(SLT group): Selective Laser Trabeculoplasty was used on this group or

(MEDICAL group): using hypotensive eye drops.

The patient was the unit of result in our study. If the two eyes were glaucomatous, the two eyes undergoing the same line of treatment but we used highest eye pressure in our study analysis.

### Materials & methods

(SLT group): In this group, patients received 180° SLT. Laser energy was adjusted at 0.4 mJ. Our aim is to reach the blanching of trabecular meshwork so we increase laser power by 0.2 mJ regularly until reaching that target.

One of the most common undesired effects is the occurrence of cavitation bubbles at the starting of laser application so we can reduce the energy by 0.1mJ until we do not find any cavitation bubble. We recorded every parameter in the session as Total number of pulses and the total energy amount for each case.

We made regular follow-up for the cases as they were evaluated at day one, the third day, after one week and after two weeks. the visual acuity, IOP, and Fundus examination were used in follow up. A repeated visual field examination was done every month for 5 months. All the complications were treated and recorded.

(MEDICAL group): Patients in this group added another antiglaucoma eye drops to their already present medication to achieve the target IOP. They added first prostaglandin analogue drops, then  $\alpha$ 2-agonist, some of them added  $\beta$ -blockers drops and carbonic anhydrase inhibitor.

Follow up for the Patients was done after 4 weeks of starting the new medical treatment to obtain our target intraocular pressure then we followed patients after two months and after three months. If after using maximum medical therapy target IOP is not reached, SLT was considered to be added to the management plan and later surgery as the last option.

### Results

After studying 120 eyes in 70 patients selected in our study, 40 eyes were selected in Laser group and 80 eyes were selected in medical treatment group. The results obtained are summarized as following:-

| Diagnosis          | Base line IOP                  | BC VA C/D                     | Degrees of SLT/ Average energy | Medication                                   | Definition of success | Follow-up |
|--------------------|--------------------------------|-------------------------------|--------------------------------|----------------------------------------------|-----------------------|-----------|
| OAG, OHT, PDS, PEX | 29.4/29                        | NA                            | 360/180/90 0.3-1.8 mJ          | Latanoprost 0.005 %                          | IOPR $\geq 20$ %      | 3 m       |
| OAG, OHT           | 26.1 $\pm 4.0$ /21.5 $\pm 4.5$ | NA                            | 360 0.2-1.5 mJ                 | Latanoprost 0.005 %                          | IOPR $\geq 20$ %      | 4 m       |
| OAG, OHT, PDS, PEX | 26/24.7                        | 0.5 $\pm 0.2$ /0.6 $\pm 0.2$  | 180 0.8 mJ                     | Latanoprost 0.005 %                          | OP $\leq 22$ mmHg     | 3 m       |
| OAG, OHT           | 26.6 $\pm 4.9$ /25.3 $\pm 5.2$ | 0.1-1.0 /0.2-1.0 0.4 $\pm 0.$ | 360 2.0 $\pm 0.2$ mJ           | Topical beta-blocker, pilocarpine, and latan | IOP $\leq 21$ mmHg    | 5 m       |

|  |  |                   |  |            |  |  |
|--|--|-------------------|--|------------|--|--|
|  |  | 2/<br>0.6±<br>0.2 |  | opros<br>t |  |  |
|--|--|-------------------|--|------------|--|--|

follow-up ranged from 3–5 months. SLT in most cases was done at 360° with power ranged from 0.21 mJ to 1.81 mJ. The mean intraocular pressure baseline is ranged from 21.0 mmHg to 29.4 mmHg in laser group, and from 22.7 mmHg to 29.3 mmHg in a group taking medical therapy. statistical difference was not present between studies ( $\chi^2 = 1.33$ ,  $P = 0.78$ ,  $I^2 = 0.0\%$ ). SLT was found to achieve a greater IOP reduction results; however, the differences in the IOP were not very statistically significant ( $WMD = 0.7$ , 94% CI:  $-0.22$ ,  $1.38$ ).

No great side effects were seen in our groups only we observed transient inflammation in the group used laser in their treatment which is treated by anti-inflammatory treatment. It is a common side effect that is noticed in many previous studies that transient inflammatory reaction was all resolved within one week in open angle glaucoma treated with laser.

Number of medications taken by the patients included in this study is ranged from  $2.22 \pm 0.98$  before laser treatment to  $1.35 \pm 1.2$  by end of follow-up.

Challenges in this study was size of sample was small and duration of follow up was short. It was difficult to find eligible patients as Eligible patients were not interested to participate in our study due to the multiple visits and lack of awareness of the laser itself despite explanation. In our society, there is fear of any recent procedure. Health awareness campaigns must be raised to educate the patients.

It is preferable to follow up patient for three years to study glaucoma changes as these changes are usually slow.

#### Discussion:-

In our study, intraocular pressure was reduced in groups treated with laser and medication with follow up for three to six months. However, no great difference noticed between laser treated group and group used medications. From this study we can say that laser is nearly as effective as medical eye drops used in open angle glaucoma in lowering the pressure. The mechanisms by which SLT can lower intraocular are not known yet. However, there are three theories that can explain this;

-The mechanical theory: as laser will lead to contraction and shrinkage of the trabecular network which lead to shortening and shrinkage of the surrounding tissue and hence opens the spaces. (9,10)

- The cell theory: stimulation of cell division by laser effect in the anterior chamber which give reconstructing cells for these sites. The proliferated

cells aggregated and became a source of different matrices, aiding in more aqueous flow.

-The biologic theory suggests that SLT causes tissue injury. Cells interaction starts and Macrophages are attracted to the site which change the extracellular matrix, leading to more aqueous outflow. SLT was proven to be an effective procedure as a primary treatment for open angle glaucoma (11,12)

#### Surgery for Open angle glaucoma:

Many surgeries can be used as a last option treatment for open angle glaucoma.

Indications of these surgeries are:-

-Patient preference.

-Very high intraocular pressure, despite using proper antiglaucoma medications, which progressively affect the field of vision.

-Primary treatment for severely progressive glaucoma that need very low target intraocular pressure. (13)

Surgical options can be Trabeculectomy with a Success rate varying from 35-85%. If we use 5-fluorouracil the success rate will be elevated, but one of its side effects that it may lead to high risk of infection.

Another surgical option can be Glaucoma drainage device.

The Non-penetrating glaucoma surgeries as Visco-canalostomy, Deep sclerectomy and Canaloplasty. (14)

#### CONCLUSION

SLT is one of the most safe and effective treatment options in cases of open angle glaucoma that can be used instead of medical treatment.as laser is an easy procedure that can be done in a single visit. Also it is safe on trabecular meshwork and also the anterior chamber with no damage. laser has economic and comfortable value by decreasing the number of eye drops used by patients. So, it is more cost effective. More studies are needed with randomized controlled design.

So we advise longer follow up periods for three years for cases of open angle glaucoma treated with laser.

#### References;

1. Weinreb RN, Aung T, Medeiros FA. The pathophysiology and treatment of glaucoma: a review. JAMA. 2014 May 14;311(18):1901-11. [PMC free article] [PubMed]
2. Borrás T. Gene expression in the trabecular meshwork and the influence of intraocular pressure. Prog Retin Eye Res. 2003 Jul;22(4):435-63. [PubMed]
3. Realini T, Fechtner RD. 56,000 ways to treat glaucoma. Ophthalmology. 2002;109:1955–6.
4. Melamed S, Ben Simon GL, Levkovitch-Verbin H. Selective laser trabeculoplasty as

- primary treatment for open-angle glaucoma: A prospective, non-randomized pilot study. *Arch Ophthalmol.* 2003;121:957–60. [PubMed] [Google Scholar] [Ref list]
5. Samples JR, Singh K, Lin SC, Francis BA, Hodapp E, Jampel HD, et al. Laser trabeculoplasty for open-angle glaucoma: a report by the american academy of ophthalmology. *Ophthalmology.* 2011;118:2296–302.
6. Katz LJ, Steinmann WC, Kabir A, Molineaux J, Wizov SS, Marcellino G. SLT/Med Study Group. Selective laser trabeculoplasty versus medical therapy as initial treatment of glaucoma: a prospective, randomized trial. *J Glaucoma.* 2012;21(7):460-8. doi: 10.1097/IJG.0b013e318218287f.
7. McIlraith I, Strasfeld M, Colev G, Hutnik CML. Selective laser trabeculoplasty as initial and adjunctive treatment for open-angle glaucoma. *J Glaucoma.* 2006;15(2):124-30.
8. Nagar M, Ogunyomade A, O'Brart DP, Howes F, Marshall J. A randomised, prospective study comparing selective laser trabeculoplasty with latanoprost for the control of intraocular pressure in ocular hypertension and open angle glaucoma. *Br J Ophthalmol.* 2005;89(11):1413-7. doi: 10.1136/bjo.2004.052795.
9. Kagan DB, Gorfinkel NS, Hutnik CM. Mechanisms of selective laser trabeculoplasty - review. *Clin Experiment Ophthalmol.* 2013;42:675–81. Return to ref 27 in article
10. Stein JD, Challa P. Mechanisms of action and efficacy of argon laser trabeculoplasty and selective laser trabeculoplasty. *Curr Opin Ophthalmol.* 2007;18:140–5.
11. Gracar R, Drnovsek-Olup B. Effects of laser beam modification on the anterior chamber angle structural changes after selective laser trabeculoplasty in animal model. *Laser Surg Med.* 2011;43:910–1.
12. Francis BA, Ianchulev T, Schofield JK, Minckler DS. Selective laser trabeculoplasty as a replacement for medical therapy in open angle glaucoma. *Am J Ophthalmol.* 2005;140:524–5. [PubMed] [Google Scholar] [Ref list]
13. Richter GM, Coleman AL. Minimally invasive glaucoma surgery: current status and future prospects. *Clin Ophthalmol.* 2016;10:189-206.
14. Prum BE, Rosenberg LF, Gedde SJ, Mansberger SL, Stein JD, Moroi SE, Herndon LW, Lim MC, Williams RD. Primary Open-Angle Glaucoma Preferred Practice Pattern® Guidelines. *Ophthalmology.* 2016 Jan;123(1):P41-P111. [PubMed] [Reference list]
15. 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;105:2082–8. discussion 2089-90. [PubMed] [Google Scholar]
16. Cvenkel B. One-year follow-up of selective laser trabeculoplasty in open angle glaucoma. *Ophthalmologica.* 2004;218:20–5. [PubMed] [Google Scholar]
17. Johnson PB, Katz LJ, Rhee DJ. Selective laser trabeculoplasty: Predictive value of early intraocular pressure measurements for success at 3 months. *Br J Ophthalmol.* 2006;90:741–3. [PMC free article] [PubMed] [Google Scholar]
18. Saito Y, Higashide T, Sugiyama K. [Clinical results of selective laser trabeculoplasty as adjunctive treatment for primary open-angle glaucoma patients] *Nihon Ganka Gakkai Zasshi.* 2007;111:953–8. [PubMed] [Google Scholar]
19. Wolfram C, Lorenz K, Breitschdel L, Verhoven Y, Pfeiffer N. Health- and vision-related quality of life in patients with ocular hypertension or primary openangle glaucoma. *Ophthalmologica* 2013; 229: 227-34.
20. Lamoureux EL, McIntosh R, Constantinou M, Fenwick EK, Xie J, Casson R, et al. Comparing the effectiveness of selective laser trabeculoplasty with topical medication as initial treatment (the Glaucoma Initial Treatment Study): study protocol for a randomised controlled trial. *Trials* 2015; 16: 406.
21. European Glaucoma Society. Terminology and guidelines for glaucoma (4<sup>th</sup> Edition). *Br J Ophthalmol* 2017; 101: 73-127.
22. Damji KF, Bovell AM, Hodge WG, Rock W, Shah K, Buhrmann R, et al. Selective laser trabeculoplasty versus argon laser trabeculoplasty: results from a 1-year randomised clinical trial. *Br J Ophthalmol* 2006; 90: 1490-4