

Selective laser trabeculoplasty vs. topical medications for step-up treatment in primary open angle glaucoma: comparing clinical effectiveness, quality of life and cost-effectiveness

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ABSTRACT

Introduction: The aim of this study was to investigate the clinical effectiveness, health related quality of life (HRQoL) and cost effectiveness of selective laser trabeculoplasty (SLT) compared to topical anti-glaucoma medications in step-up treatment of patients with primary open angle glaucoma (POAG).

Methods: Seventeen POAG patients with suboptimal IOP control despite pre-existing topical medications were subjected to adjunct SLT (50 applications 180 degrees) or second line medical therapy. Current medications were continued, and patients were followed up for 6 months for degree of intraocular pressure (IOP) lowering. HRQoL was assessed using Glaucoma Quality of Life 36-item (GlauQoL-36), Assessment of Quality of Life-7D (AQoL-7D) and Vision related Quality of Life (VisQoL). Costs involved were calculated and compared to the effect (IOP reduction) achieved in each arm.

Results: Ten patients were in the SLT group and 7 in the topical medication (MED) group. Mean baseline intraocular pressure (IOP) was 18.90 ± 3.48 mmHg in SLT group and 15.57 ± 2.23 mmHg in MED group. Mean reduction of IOP was 4.30 ± 1.64 mmHg in SLT group and 2.71 ± 2.56 mmHg in MED group at 6 months which was not statistically significant ($p=0.14$) between two groups. All the HRQoL questionnaires did not show significant changes in the groups or between groups when compared baseline with 6-month post treatment (p -values ranging from 0.247 to 0.987). For every 1mmHg reduction in IOP, cost involved in MED group (RM53.61) was 165% of the cost involved in SLT group (RM32.56).

Discussion and Conclusion: This study has shown that SLT was as effective clinically and tolerable as topical anti glaucoma medications and was possibly more cost effective in the step-up treatment of patients with POAG at 6 months follow-up.

KEY WORDS:

selective laser trabeculoplasty, topical antiglaucoma, clinical effectiveness, quality of life, cost effectiveness, primary open angle glaucoma, prospective pilot cohort study

INTRODUCTION

The mainstay treatment for glaucoma is lowering of intraocular pressure (IOP) through topical anti-glaucoma medications. Whilst effective in lowering IOP, topical medications have significant disadvantages. These medications need to be used every day for the remainder of the patients' life with significant side-effects, both local and systemic which can have a considerable impact on the quality of life (QoL) of the patients. For these reasons, many patients are not compliant to the medications. In glaucoma, it has been estimated that non-adherence can be as high as 59% among patients using topical anti-glaucoma medications.¹ Recently, a study by Rees et. al. reported almost 50% of patients with glaucoma failed to adhere to their medication regimens and, of these, almost 18% intentionally do not adhere.²

Over the past three decades, laser trabeculoplasty has been proposed as an alternative mode of therapy for controlling of IOP.³⁻⁵ Laser trabeculoplasty reduces the need for topical medications and side-effects associated with it. The Glaucoma Laser Trial (GLT) compared an older laser modality [β Argon Laser Trabeculoplasty (ALT)] with Timolol, a topical-blocker which at that time constituted the first line choice of topical medication for glaucoma. GLT demonstrated ALT provided a longer control of IOP without the need for additional therapy, and also provided greater stability of visual field and optic nerve status.⁶ Although results were promising, there was no definite consensus on the role of laser trabeculoplasty in the management of glaucoma until the introduction of a safer selective laser trabeculoplasty (SLT) in 2002.⁷ SLT utilises a Q-switched, frequency doubled Nd:YAG (532nm) laser that has been developed to lower IOP in patients with glaucoma by restoring aqueous humour outflow through the trabecular meshwork.⁸ It has benefits over ALT by inducing less damage to the trabecular meshwork architecture making the SLT potentially repeatable.

There are few studies comparing SLT to medical therapy for the initial treatment of POAG with varying clinical outcomes.¹⁰⁻¹² These studies were focused on the SLT as the initial treatment for

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glaucoma and not SLT as adjunct therapy in patients with pre-existing topical anti-glaucoma medications. To the best of our knowledge there are two ongoing studies focusing on clinical effectiveness, quality of life and cost effectiveness of SLT vs. topical medications in initial treatment,¹³⁻¹⁴ but not on step-up treatment of POAG patients.

Therefore, a pilot study to compare clinical effectiveness, health related QoL (HRQoL), and cost effectiveness between SLT and topical medications in the step-up treatment of patients with primary open angle glaucoma (POAG) was initiated.

MATERIALS AND METHODS

A prospective pilot cohort study was conducted in the Department of Ophthalmology, Universiti Kebangsaan Malaysia Medical Centre (UKMMC) from February 2016 to October 2017. Seventeen POAG patients were included in the study with minimum of 6 months follow up. The protocol of this study was approved by the Research and Ethic Committee UKM (FF-2016-046) and all study procedures adhered to the tenets of the Declaration of Helsinki.

Patients diagnosed with POAG with suboptimal IOP control despite pre-existing topical anti-glaucoma medications that warrants a step-up therapy were invited to join the study. The inclusion criteria include: patients aged 18 years and above; diagnosed with POAG with typical glaucomatous optic nerve head and retinal nerve fibre layer damage with corresponding visual field damage, open anterior chamber angle and no signs of any secondary glaucoma,¹⁵ using three or less topical anti-glaucoma medications; mean deviation (MD) values between 0 and -12 dB at baseline in the study eye on Humphrey Field Analyser (HFA); evidence of glaucoma progression that warranted step-up treatment which include a) IOP greater than 21 mmHg or pre-set target IOP and/or, b) progressive visual field (VF) changes with at least two reliable and reproducible HFA reading (MD > -0.5/year, or new local depress point in pattern deviation) and/or, c) new optic disc (OD) changes e.g. increased cupping and presence of new disc haemorrhages; and able to sign written informed consent. Patients were excluded if: presence of history or evidence of glaucoma other than POAG; advanced glaucomatous field loss with MD > -12dB; previous history of intraocular surgery (including glaucoma surgery), with the exception of uncomplicated phacoemulsification that did not require additional intervention for complications; iridotrabecular drainage angle anomalies; evidence of severe non-proliferative diabetic retinopathy or worse, neovascularisation or rubeosis iridis; current use of a systemic corticosteroid, epinephrine or clonidine; any conditions precluding or presumed to preclude reliable VFs and disc photography; and unable to come for six months of follow-up.

Eligible patients were consecutively identified during consultation in the clinic and given patient information sheet (PIS). Patients who were agreeable for the study were given another appointment within two weeks. After informed consent was obtained, they underwent review of their ocular and medical history followed by

comprehensive ophthalmic examination including best corrected visual acuity (BCVA) using Snellen chart, IOP measurement using single assigned Goldmann applanation tonometry (Haag-Streit, Koniz, Switzerland), gonioscopy using two-mirror gonioscopy lens (Volk, OH, USA), dilated fundus examination with 78D lens (Volk, OH, USA), and visual field testing using HFA central 24-2 SITA standard strategy. Data include age, gender, ethnicity, types of glaucoma, number of topical anti-glaucoma used, and systemic co-morbidities has been collected.

IOP was measured at least twice at every study visit between 8:00AM and 12:00PM by an investigator NWL who was masked to the treatment allocation. The mean IOP was taken from the two measurements. If the two readings differ by more than 2mmHg, then a third reading was performed and the median of the three readings was taken as the IOP measurement. HRQoL was assessed during baseline visit and 6-month post procedure, using three different sets of self-administered questionnaires, the Glaucoma Quality of Life 36-item (GlauQoL-36), Assessment of Quality of Life-7D (AQoL-7D) and Vision related Quality of Life (VisQoL). VisQoL is a subset of the AQoL-7D questionnaire.

The patients were then randomised to one of the two treatment groups: adding SLT treatment (SLT group) or stepping-up topical anti-glaucoma medication (MED group) using a list of computer generated pseudo-random numbers designed to yield expected assignment ratio of 1:1. The randomisation number was assigned to patients sequentially according to the order of enrolment within the strata. The unit of analysis was the patient. If both eyes require treatment, both eyes received the same treatment but only the eye with highest IOP was used for analysis. In the case where the IOP was same in both eyes, the worst eye with more severe MD from HFA was used. All other personnel were masked to the randomisation of patients except the study investigators (YMH and JCH). It was not possible to mask the patients. The CONSORT diagram for the study is shown in Figure 1.

Treatment Groups and Sequence of Steps

SLT group (refer to Figure 5)

In the SLT treatment group, patients were received 180° SLT applied inferiorly from 3 to 9 o'clock position for 50 applications (48-53 spots) within 14 days of randomisation. A single application of pilocarpine 1% (Alcon, Texas, USA) and brimonidine tartrate 0.15% (Allergan, Dublin, Republic of Ireland) was instilled into both eyes prior to the SLT. The Coherent Medical Lumenis Select 7000 laser (Lumenis, CA, USA) was used in all cases. Ocular Latina SLT Gonio Laser lens (Ocular Instruments, WA, USA) was used for visualisation and treatment of the angle for SLT in all cases. Laser energy was set at 0.5mJ and the initial laser pulse was delivered at the 3 o'clock position. Laser power was adjusted by 0.1mJ steps until cavitation bubbles and/or blanching of trabecular meshwork was seen. If cavitation bubbles were seen at the initial laser delivery, the laser energy was reduced by 0.1mJ steps at adjacent sites until no bubble formation was observed and treatment will continue at this energy level. The total number of pulses delivered, and the total amount of energy delivered was recorded following each treatment.

Patients were reviewed after 6 weeks post-procedure and then followed a stepped regimen, depending on their response to treatment. If the IOP was above the target IOP then a second SLT treatment was applied over 180° from the 9 to 3 o'clock positions (superiorly). When the IOP had achieved target IOP, patients were reviewed again at 3 months and 6 months. If target IOP was not achieved after 360° SLT, patients would be switched to medication regime by adding topical anti-glaucoma medications or advised for surgical treatment. A change of treatment was also initiated if there was an adverse event during treatment or any progression of the visual fields or optic disc.

MED group (refer to Figure 5)

Patients in the MED group were advised to step-up their topical anti-glaucoma medications by adding another topical anti-glaucoma medication group until achieving target IOP. The step-up regime was following the sequence of adding first prostaglandin group, followed by β -blocker, α 2-agonist, and carbonic anhydrase inhibitor. Compliance, technique, and timing of medications were emphasised to the patients. Patients were then reviewed after 6 weeks of starting the new topical anti-glaucoma medications treatment. If target IOP was not achieved, another topical medication was added according to the sequence described. If target IOP was not achieved despite maximum topical anti-glaucoma medications, SLT will be added following the SLT treatment regime or advised for glaucoma filtering surgery. If the target IOP was achieved, patients were then followed up at 3 months and 6 months. A change of treatment was also initiated if there was an adverse event during treatment or any progression of visual fields or optic disc.

Patients were followed until completion of 6 months follow up, withdrawal, or death. All patients were seen at baseline, 6 weeks, 3 months and 6 months after randomisation. Patients who exhibited suboptimal response (IOP above target IOP) were seen at 6-weekly intervals until the IOP was reduced to the target IOP. The target IOP was set during the baseline visit as 25% reduction from the pre-treatment IOP (IOP during diagnosis of glaucoma before starting first line treatment), or in cases of disease progression despite achieving 25% reduction from pre-treatment IOP, further 5% IOP reduction (30%) was set as target IOP. Health-related quality of life (HRQoL) was assessed at the baseline and 6 months post-treatment visits.

For the purpose of treatment cost analysis, charges for SLT treatment and cost-prices of all types of added topical anti-glaucoma medications were taken into considerations. The cost involved in SLT was based on the maintenance cost that was charged to each individual patient that received SLT treatment in our UKMMC, which is Ringgit Malaysia (RM) 140.00 for one eye and it included cost of repeated laser within one year. The cost for step-up topical anti-glaucoma medications was based on the cost prices (per month per eye) of each type of topical anti-glaucoma medications in UKMMC, which were partially subsidised under the Malaysia national health care policy, in which prostaglandin analogue (generic) was RM6.00, β -blocker (generic) RM3.90, α 2-agonist RM42.70 and carbonic anhydrase inhibitor RM62.20. The mean cost of all the newly added topical medications in MED groups was calculated. The mean costs involved in both groups

were compared with the respective clinical effectiveness (mean IOP reduction) at the end of study for simple cost-effectiveness analysis.

Data analysis

Statistical analysis was performed using SPSS for Windows version 20. Study data was checked for normality with Shapiro-Wilk test. Descriptive statistics were described as mean \pm standard deviation. IOP reduction was calculated at 3-month and 6-month from baseline. HRQoL questionnaires scorings were calculated at baseline and 6-month. Differences in IOP reduction and HRQoL changes between two groups were analysed with t-test and general linear model. The degree of IOP reduction was adjusted to the cost of treatment and compared between two groups.

The unit of analysis was the patient (one eye of each patient). p-values of <0.05 was considered statistically significant.

RESULTS

A total of seventeen patients were recruited into the study. Ten patients were assigned to the SLT group and 7 patients to the MED group. Three patients refused to join the questionnaire study but were agreed for IOP study (one from SLT group, two from MED group). Characteristics of the study populations in both groups were comparable (Table I) and were normally distributed. The only statistically significant difference was the baseline IOP between SLT and MED groups ($p=0.042$).

The IOP lowering effect was statistically significant in both SLT and MED groups at 3 months and 6 months when compared to baseline IOP using general linear model repeated measure analysis ($p<0.001$ for SLT, $p=0.03$ for MED) as shown in Figure 2. However, IOP lowering effect between SLT and MED groups at 3 months and 6 months when compared to baseline IOP was not statistically significant ($p=0.31$). Similar result was also seen in the differences of IOP reduction between SLT and MED group at 3 months and 6 months ($p=0.32$, $p=0.14$ respectively) as shown in Figure 5. There was no statistical difference between number of previous topical anti-glaucoma medications and IOP lowering effect within groups (One-way ANOVA test; $p=0.67$ in 3 months, $p=0.92$ in 6 months).

The number of patients who had completed HRQoL questionnaires for both baseline and 6 months follow-up were 14 (nine from SLT group, five from MED group). Improvement of HRQoL was seen in AQoL-7D questionnaire for SLT group and no change in HRQoL was seen in GlauQoL-36 questionnaire for MED group at six months. On the other hand, worsening of HRQoL for both SLT and MED group was seen in the other questionnaires at 6 months. However, these changes were very small (less than 3% change in scoring) and were not statistically significant in all three questionnaires: GlauQoL, AQoL-7D and VisQoL (p value was 0.247, 0.571, 0.987, respectively) as shown in Figure 6. There was no significant correlation between severity of glaucoma (based on MD from HFA) and IOP at baseline with HRQoL in all three questionnaires: GlauQoL, AQoL-7D and VisQoL (Pearson correlation coefficient; $r=0.25-0.48$, $p=0.08-0.40$ for MD and $r=0.09-0.37$, $p=0.20-0.77$ for IOP).

Table I: Characteristics of the study population

Characteristics	SLT Group (n=10) (f, %)	MED Group (n=7) (f, %)	P-value	
Mean age (years) Range	67.40±7.80 54-81	69.57±5.77 60-76	0.54 ^b	
Gender	Male	4 (40.0%)	5 (71.4%)	0.20 ^c
	Female	6 (60.0%)	2 (28.6%)	0.34 ^a
Ethnicity	Malay	3 (30.0%)	2 (28.6%)	0.95 ^c
	Chinese	7 (70.0%)	5 (71.4%)	1.00 ^a
	Indian	0	0	
	Others	0	0	
Eye laterality	Left	4 (40.0%)	3 (42.9%)	0.91 ^c
	Right	6 (60.0%)	4 (57.1%)	1.00 ^a
Diagnosis	NTG	2 (20.0%)	3 (42.9%)	0.31 ^c
	POAG	8 (80.0%)	4 (57.1%)	0.59 ^a
Number of previous eye drops	1	2 (20.0%)	2 (28.6%)	0.68 ^c
	2	3 (30.0%)	3 (42.8%)	
	3	5 (50.0%)	2 (28.6%)	
Mean number of previous eye drop	2.3±0.8	2.0±0.8	0.471 ^b	
Mean Baseline IOP (mmHg)	18.90±3.48	15.57±2.23	0.042 ^b	
Mean Baseline MD (dB)	-7.88±3.55	-7.37±3.66	0.778 ^b	
Mean Baseline PSD (dB)	5.49±3.14	4.95±1.83	0.688 ^b	

*Selective laser trabeculoplasty, SLT; topical anti-glaucoma medication, MED; intraocular pressure, IOP; mean deviation, MD; pattern standard deviation, PSD; Humphrey field analyser, HFA; primary open angle glaucoma, POAG; normotensive glaucoma, NTG ^aFischer's exact test

^bt-test

^cχ²-test

There were no major side-effects noticed in MED group. Transient anterior chamber reaction was seen after all patients in SLT group which resolved with topical steroid eye drops. Otherwise, no other complications were documented throughout the six months period of follow-up.

All patients in MED group were stepped up with one topical anti-glaucoma medication at the end of 6 months study. Out of the 7 patients in MED group, 3 patients were stepped up with prostaglandinβ analogue (generic), 2 with 2-agonist, one each with - blocker (generic) and carbonic anhydrase inhibitor. Hence the mean cost involved in MED group on the step-up topical anti glaucoma medication was RM145.29 for 6 months per eye based on the cost price in our centre as mentioned prior.

For simple cost effectiveness analysis based on the respective maintenance cost in SLT group (RM140.00) and mean cost price in MED group (RM145.29), every 1mmHg reduction in IOP in SLT group the cost involved was RM32.56 in 6 months, whereas in MED group every 1mmHg reduction in IOP the cost involved was RM53.61 in 6 months, which was 165% of the cost involved in SLT.

DISCUSSION

In this study, IOP reduction was achieved in both SLT and MED groups at 3- and 6-month follow-up period. However, there was no significant difference of IOP reduction between SLT and MED group. This shows that SLT is equally effective in reducing IOP as topical anti-glaucoma medication in POAG patients in step-up glaucoma treatment.

Our results were comparable with previous studies which showed IOP lowering effect of SLT was similar to topical anti-glaucoma medications. However, these studies compared the effectiveness

of SLT to topical anti β-glaucoma medication, e.g., prostaglandin analogue and -blocker for the initial treatment in POAG.¹⁰⁻¹² Previous study had also shown that patients receiving combined ALT and topical anti-glaucoma medications were less likely to fail their therapy than those on solely topical anti-glaucoma medications.¹⁶ However, these studies compared the combination treatment of ALT with topical anti-glaucoma medications but not SLT.

In step-up treatment, patients were started on the first line topical anti-glaucoma medications, e.g., prostaglandin analogue and/or β-blocker. To achieve the target IOP and a better IOP reduction, second line agents were added. However, second line agents will have less clinical effects compared to first line agents, due to the overlapped mechanism of actions among the topical anti-glaucoma medications.^{17,18} SLT has different mechanism of action compared to topical anti-glaucoma medications which make it more likely to reduce IOP in step-up treatment. SLT increases aqueous humour outflow by altering the structure and function of trabecular meshwork.¹⁹

However, the magnitude of IOP lowering will be less in the step-up treatment compared to initial treatment because most of the IOP lowering effect was achieved by the initial treatment.¹⁷ An IOP reduction of 8mmHg or 30% from the baseline IOP (around 26mmHg) for initial treatment with either SLT or topical anti-glaucoma medications was demonstrated by Lai et al.¹² An IOP reduction from baseline of 22% in SLT group compared to 16% in MED group was demonstrated in our study despite the baseline IOP was higher in the SLT group compared to MED group (18.9mmHg vs. 15.6mmHg respectively). These findings showed SLT might achieve the IOP reduction needed regardless of pre-existing anti-glaucoma medications.

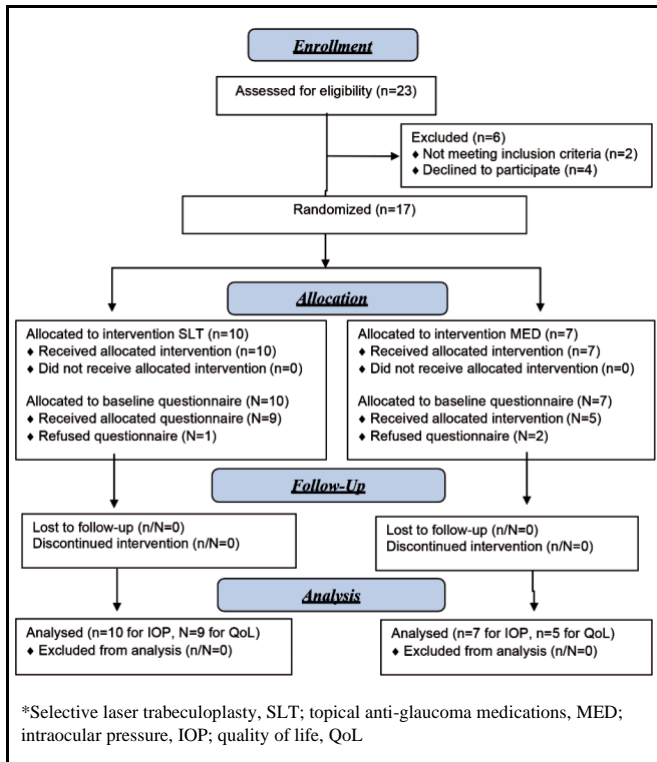


Fig. 1: CONSORT diagram of the patient flow in the study

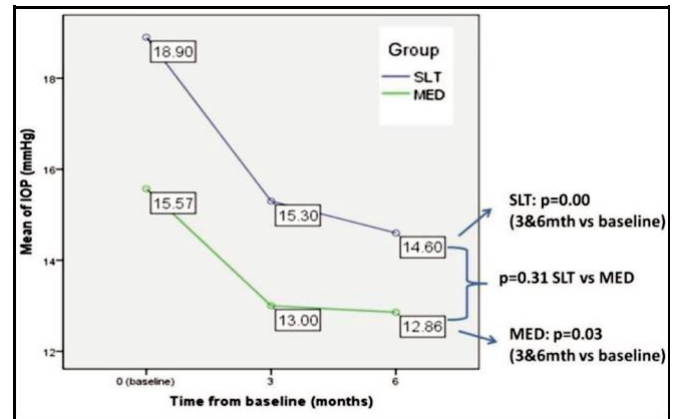


Fig. 2: Comparison of Intraocular Pressure (IOP) between selective laser trabeculoplasty (SLT) and topical anti-glaucoma medication (MED) group at baseline, 3 months and 6 months follow-up

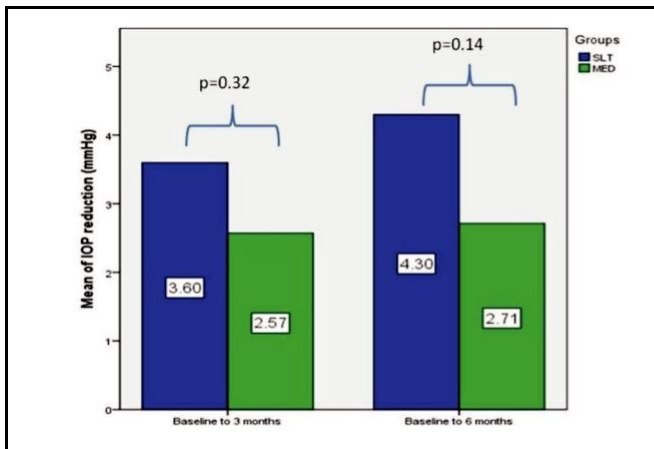


Fig. 3: Comparison of differences in intraocular pressure (IOP) reduction between selective laser trabeculoplasty (SLT) and topical anti-glaucoma medication (MED) group at 3 months and 6 months follow-up

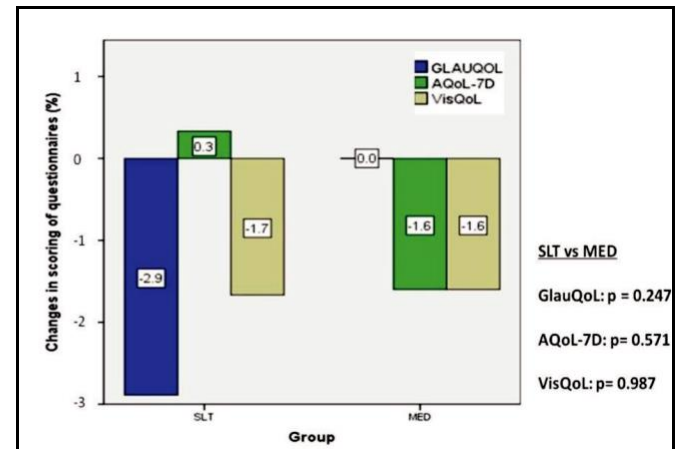


Fig. 4: Changes in Health-related Quality of Life questionnaire score between selective laser trabeculoplasty (SLT) and topical anti-glaucoma medication (MED) group at six months follow-up from baseline.
*Glaucoma Quality of Life 36 Item, GlauQoL36; Assessment of Quality of Life-7D, AQoL-7D; Vision-related Quality of Life, VisQoL

An improvement of HRQoL was expected in the SLT group compared to MED group. However, a very slight worsening of HRQoL was found in both SLT and MED groups at 6 months. The reductions of HRQoL in the SLT group may be attributable to the need to use topical anti-glaucoma medication even though laser procedure had been performed. Usages of eye drops regardless of the number were negatively associated with HRQoL scores.²⁰ However, there were no significant differences in the changes of

mean scores of HRQoL questionnaires between SLT and MED group. The limited change in the QoL can be due to the short follow up duration that was unable to detect changes in chronic disease like glaucoma. Much longer follow up duration was needed to aid in better understanding of the QoL changes that can happen.

There are two on-going studies that compare HRQoL in these groups of patients but only confined to newly diagnosed

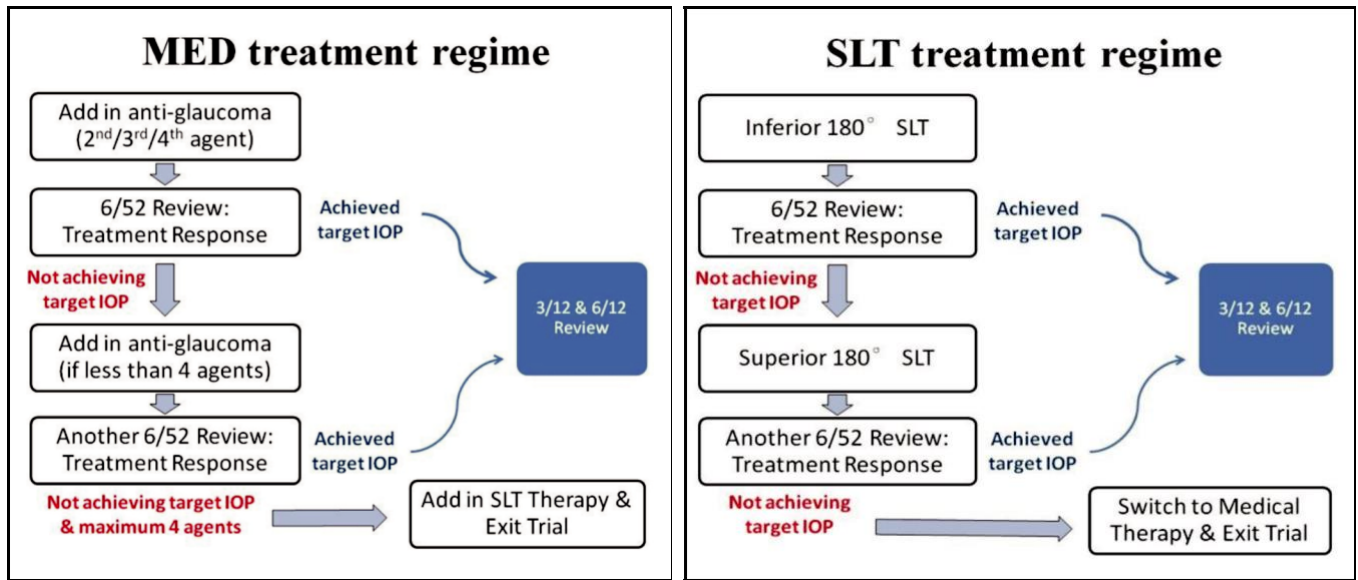


Fig. 5: Flow diagram for each treatment group allocation; MED group (stepping up topical anti-glaucoma medication) or SLT group (selective laser trabeculoplasty).

patients.¹³⁻¹⁴ To our knowledge, ours is the first study to do this comparison in a step-up glaucoma treatment population, together with cost effectiveness analysis and clinical effectiveness. These three HRQoL questionnaires were validated, comprehensive and had different domains focusing on impact on QoL which are sensitive to change of intervention which makes these questionnaires more relevant in our study.²¹⁻²⁴

The HRQoL questionnaires were poorly correlated with the severity of glaucoma as measured by visual field parameters (MD and PSD). In contrast, Early Manifest Glaucoma Treatment (EMGT) study showed HRQoL was correlated with worsening MD but not IOP using National Eye Institute Visual Functioning Questionnaire 25 (NEI-VFQ 25).²⁵ Even though severity of glaucoma in both study population was different, our population which was in the mild to moderate severity perceived their visual damage as not significantly affecting their daily life. This observation was also shown in a study by Wolfram et al. who demonstrated there were no significant differences in HRQoL between healthy subjects and early POAG patients.²⁶

There were no major side-effects seen in both groups except transient ocular inflammation in the SLT group which resolved with steroid treatment. This finding was similarly to a previous study by Lai et al., that reported all their patients treated with SLT had transient anterior chamber reaction which was all resolved after one week.¹²

Simple cost effectiveness analysis showed that the cost involved in MED group was 165% of the cost involved in SLT group, which showed clearly the adjunct SLT was more cost effective than adding another topical medication. However, the cost involved in SLT was based on the maintenance cost (SLT laser machine as the asset) and not the cost of setting up a new SLT laser service which will involve the cost of a new SLT laser machine. The cost involved in adding topical medications was based on place of practice and in our setting, the topical medications were largely subsidised by the

government and may not reveal the real cost price especially in private practice or other countries. We can postulate that if the medications cost was not subsidised, the treatment cost in MED group should be significantly higher.

Major limitation of the study was the small sample size and short follow-up period. It was difficult to recruit eligible patients due to the inclusion and exclusion criteria. Usually, a longer duration of follow-up (3 years or more) is suitable for studies relating to HRQoL in patients with glaucoma as the changes are slow, as showed in EMGT study. In the first three years of the study, there was no difference in HRQoL scores between treatment and observation group.²⁵ Another study involving more glaucoma centres needs to conduct this study to achieve a larger sample size with a longer follow-up period to answer the research question.

Eligible patients were not keen to be involved in an RCT due to the frequent visits and involvement of a procedural therapy. In our community, there is fear in undergoing any procedure due to lack of awareness of the procedure itself despite proper explanation and counselling. Public health awareness campaigns need to be raised to increase consciousness about new evolving procedure or surgeries which can be beneficial to patients.

Another limitation is difficulties in obtaining response for the HRQoL questionnaires. Some patients refused to answer the HRQoL questionnaire due to complexity and time needed to fill in the questionnaires. It may also probably be due to their unwillingness of to reveal their perception of their health to the health personnel. A shorter and simple questionnaire might be useful for future glaucoma studies.

In conclusion, this pilot study showed that SLT is possibly as effective as topical anti glaucoma medications and is possibly more cost effective in the step-up treatment of patients with primary open angle glaucoma (POAG). We would like to suggest a further study with randomised controlled design in a multi-centre setting for longer follow up of at least 3 years to compare the clinical

effectiveness, cost effectiveness and QoL for patients stepped up with either SLT or extra eye drop. If SLT can be proven to be superior or at least equally effective clinically and financially, SLT can be used as an adjunct therapy in treating POAG patients with suboptimal IOP control despite pre-existing topical anti-glaucoma medications and glaucoma progression.

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