Modified CO2 Laser-assisted Deep Sclerectomy Compared With Conventional Tabeculectomy in Chinese Primary Open-angle Glaucoma

Yang Zhang
Chinese Academy of Medical Sciences and Peking Union Medical College
Jin Mao
Macau Health Bureau
Qi Zhou
Chinese Academy of Medical Sciences and Peking Union Medical College
Lüe Li
Chinese Academy of Medical Sciences and Peking Union Medical College
Shunhua Zhang
Chinese Academy of Medical Sciences and Peking Union Medical College
Ailing Bian
Chinese Academy of Medical Sciences and Peking Union Medical College
Gangwei Cheng (ChengGW@pumch.cn)
Chinese Academy of Medical Sciences and Peking Union Medical College

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Abstract

Purpose: To evaluate the efficacy and safety of modified CO2 laser-assisted sclerectomy surgery (MCLASS) compared with conventional trabeculectomy (TRAB) in medically uncontrolled Chinese primary open-angle glaucoma (POAG) patients.

Methods: A total of 87 patients were reviewed, including 45 in the MCLASS group and 42 in the TRAB group. Intraocular pressure (IOP), best corrected visual acuity (BCVA) and use of supplemental medical therapy were retrospectively compared at baseline and until 24 months postoperatively.

Results: Patients in both groups achieved a significant IOP decrease from baseline ($P < 0.001$), and postoperative IOP in the MCLASS group was significantly lower than that of the TRAB group at 12 and 24 months. The reduction of medication was statistically significant in both groups, and the number of postoperative medications was significantly higher in the TRAB group at 12 and 24 months. At 12 and 24 months, the complete success rates were 60% and 53.3%, respectively, for MCLASS versus 66.7% and 59.5%, respectively, for TRAB; the qualified success rates were 91.1% and 88.9%, respectively, for MCLASS versus 83.3% and 80.9%, respectively, for TRAB. BCVA deterioration post-TRAB was clinically more serious than that of post-MCLASS at 12 and 24 months, respectively. However, there was no statistically significant difference between the two groups at any time point postoperatively. Compared with MCLASS, more complications occurred postoperatively in the TRAB group.

Conclusion: MCLASS is an effective surgical option for Chinese POAG patients, showing success rate results comparable with TRAB while having greater IOP reduction, fewer medications and a lower risk of complications compared to TRAB up to 24 months.

Introduction

Since the introduction of Cairns' trabeculectomy (TRAB) in 1968[1], it has become a major treatment for all types of glaucoma. Currently it is still considered to be the gold-standard procedure for lowering intraocular pressure (IOP) in patients with primary open-angle glaucoma (POAG). However, this procedure carries a range of potential complications, such as hypotony, hyphaema, anterior chamber flattening, choroid detachment, accelerated cataract progression, macular oedema, decompression retinopathy, leakage and infection of filtration bleb; some of these may even be sight-threatening [2].

There has recently been renewed interest in nonpenetrating deep sclerectomy (NPDS) for glaucoma [3]. NPDS was developed to overcome severe complications and improve the safety of conventional filtering procedures by keeping the inner wall of the trabecular meshwork (TM) intact and stabilizing the anterior chamber and fluctuation of IOP [4]. However, the main drawback of NPDS is technical difficulty, which has never permitted this technique to gain popularity among glaucoma surgeons. The most common intraoperative complication of this surgery is perforation of the thin Trabeculo-Descemet membrane during deep sclerectomy dissection. CO2 laser-assisted sclerectomy surgery (CLASS) is an improved

version of the difficult manual procedure of NPDS, which uses the unique characteristic of CO2 laser to ablate only the dry scleral tissue in a precise and efficient manner. Once the outer wall of the Schlemm canal (SC) is opened, the CO2 laser becomes non-effective due to aqueous percolation; consequently, excessive tissue ablation is prevented and the inner wall of the SC is kept intact, avoiding penetration into the anterior chamber [5].

Considering the refractory scarring characteristics and the specific anatomical features of the anterior chamber in East Asians (including Chinese), we designed a modified CLASS procedure combined with preventive laser iris management and demonstrated its long-term efficacy and safety for Chinese POAG patients in our earlier study [6]. Thus far, there have been few studies comparing CLASS with trabeculectomy. In view of the paucity of the current literature, we designed the current study to compare the efficacy and safety of TRAB with the MCLASS procedure combined with preventive laser iris management in Chinese patients with medically uncontrolled POAG over the long term.

Methods

This was a single-centre retrospective comparative study. The study protocol was approved by the Institutional Review Board of the Peking Union Medical College Hospital (PUMCH) and was performed according to the tenets of the Declaration of Helsinki. Informed consent was obtained from all subjects before recruitment.

Forty-five POAG patients underwent MCLASS and 42 POAG patients underwent TRAB procedures from 2010 to 2018. The patients were enrolled and followed up postoperatively until 24 months. Inclusion criteria included out-of-control IOP despite maximum tolerated doses of pharmacological agents, glaucomatous optic nerve morphology, open angle under gonioscopy and progressive visual field (VF) loss. Patients were excluded if there was eye trauma or inflammation, if there was an opacity that might interfere with optic nerve evaluation, if there was other reason to cause IOP increase, or if the patient had received previous eye surgery.

Baseline examinations within two weeks before surgery and follow-up examinations at 1 week, and at 1, 3, 6, 12 and 24 months after surgery were recorded, including best corrected visual acuity (BCVA), IOP determined with a calibrated Goldman applanation tonometer, slit lamp and eye fundus. The number of antiglaucoma medications and postoperative complications were also recorded. The inner wall of the TM was assessed by gonioscopy at each follow-up visit. Postoperative ultrasound biomicroscopy (UBM) was performed at 1, 3, 12 and 24 months.

“Complete success” was defined as IOP values ranging between five and 18 mmHg and a reduction of ≥ 20% without the need for additional hypotensive medications or reoperation for glaucoma. “Qualified success” was defined as the same outcome; however, it included subjects who required hypotensive medications postoperatively.

Surgical technique

Operations were generally performed under surface anaesthesia with oxybuprocaine hydrochloride eye drops and subconjunctival anaesthesia in the operative field with 2% lidocaine without epinephrine. The patients with a VF radius of no greater than 10 degrees or cup-to-disc area ratio $\geq$ 0.9 were operated on under general anaesthesia.

MCLASS procedure

MCLASS was performed following the technique described in our earlier study [6]. Gonioscopy was used to evaluate the superior angle. The preferred gonio position was marked for the planned scleral ablation area, and all eyes underwent broad-based peripheral laser peripheral iridotomy (LPI) and argon laser peripheral iridoplasty (ALPI) surrounding the LPI hole within 1–3 days preoperatively. A superior fornix-based conjunctival flap was created and the Tenon capsule was dissected to expose the sclera. We then created a 5 × 5 mm rectangular limbal-based flap, of 1/3–1/2 partial thickness and extended by 1 mm into the clear cornea. The CO2 laser beam was first applied over the posterior scleral bed to create a deep rectangle scleral lake (4 × 2.2mm). It was then applied over the surgical limbus to unroof the area of the Schlemm canal (4 × 1.5mm). Finally, the CO2 laser beam was moved forward to ablate a 4 × 1 mm area in Trabeculo-Descemet's window (TDW). Following laser ablation, the scleral flap was repositioned and fastened with two adjustable sutures using 10/0 nylon at the top corners. The conjunctiva was secured using buried 10/0 nylon sutures.

TRAB procedure

TRAB was performed generally according to the technique described by Cairns. A superior fornix-based conjunctival flap was created to expose the sclera. A 1/3 thickness limbal-based 4 × 4 mm scleral flap was dissected. A block of tissue of 1 × 2 mm was removed just anterior to the scleral spur to enter the anterior chamber, followed by a peripheral iridectomy. The superficial flap was repositioned and sealed with two fixation sutures and two adjustable sutures (10/0 nylon). The conjunctiva was watertightly closed with 10/0 nylon sutures.

Mitomycin C (MMC) was applied by soaked sponges under the scleral flap and conjunctiva in both the TRAB and the MCLASS groups. If an adequate bleb was not formed or the target pressure was not reached, adjustable sutures were removed earlier within the first two weeks after surgery to maintain smooth outflow during the scar formation stage.

Postoperatively in both groups, patients were treated with 1% prednisolone acetate drops (Pred Forte; Allergan, Irvine, CA) six times daily and the dose was tapered for at least four weeks; the patients also received ofloxacin ophthalmic solution (Santen Pharmaceutical Co., Osaka, Japan) four times daily for 3 weeks. In the MCLASS group, 2% pilocarpine was administered each night for at least 4 weeks. In the TRAB group, atropine three times daily was added for 1–4 weeks.

In the MCLASS group, if the IOP exceeded 21 mmHg and a severe reduction in the size of the scleral lake was detected by UBM after the procedure, subconjunctival and subscleral 5-Fu (0.2 mL, 25 mg/mL) was

injected. After excluding internal obstacles arising from severe peripheral anterior synechiae (PAS) or iris incarceration, laser goniopuncture (LGP) was performed with a Microruptor II neodymium:yttrium-aluminium-garnet (Nd:YAG) laser when IOP exceeded the target level owing to insufficient aqueous percolation through the SC and TDW.

In the TRAB group, postoperative ocular digital massage was carried out when the anterior chamber was formed and IOP > 12mm Hg. In the case of IOP elevation above 21 mmHg and the filtering bleb was encysted or showed signs of fibrosis, a needling procedure was carried out followed by a subconjunctival and subscleral injection of 5-Fu (0.2 mL, 25 mg/mL) at the trabeculectomy site.

Statistical analysis

All analyses were performed using SPSS Statistics Premium v21 (IBM Corp., Armonk, NY, USA). Descriptive statistical results were presented as means ± standard deviation (SD), as medians and interquartile range for continuous variables, or as n (%) for categorical variables. Data were tested for normality using the Kolmogorov-Smirnov test; parametric or nonparametric tests were then applied accordingly. Univariate associations between two categorical variables were analysed using the chi-squared test or Fisher's exact test when any cell value was smaller than 5 in cross tabulations. Mann–Whitney tests and a t test were used to compare continuous parameters between the two groups. Repeated measurements of quantitative variables were compared with a paired t test (for normally distributed differences in both groups) or Wilcoxon paired signed rank test (otherwise). The BCVA was expressed as the standard logarithmic value of VA and was converted to a logarithm of the minimal angle of resolution (LogMAR) for statistical analysis. Data were considered to be statistically significant when $P < 0.05$.

Results

A total of 87 eyes of 87 patients were enrolled in the study; 45 eyes underwent MCLASS and 42 eyes underwent TRAB. There was no significant difference in age, sex, baseline IOP, BCVA, proportion of VF or number of preoperative antiglaucoma medications between the groups ($P > 0.05$; Table 1).

Patients in both groups achieved a significant IOP decrease from baseline ($P < 0.001$), with a lower IOP in the MCLASS group at one week postoperatively ($P = 0.001$); there was no significant difference between the two groups at 1, 3 or 6 months postoperatively. Postoperative IOP in the MCLASS group was significantly lower than that of the TRAB group at 12 and 24 months (Table 2). The mean IOP reduction fluctuation at 12 and 24 months was 50.7% (95% confidence interval [CI], 37.2–63.8) and 53.2% (95% confidence interval [CI], 39.7–66.3), respectively, in the MCLASS group compared to 47.5% (95% confidence interval [CI], 36.3–59.3) and 40.0% (95% confidence interval [CI], 26.8–53.2), respectively, in the TRAB group.

At 12 and 24 months postoperatively, the number of antiglaucoma medications taken per patient was reduced from 3–4 in both groups to 0–1 in the MCLASS group and 0–2 in the TRAB group, $P < 0.05$; there

was a significant difference in the number of therapeutic medications taken when compared between the two groups at 12 and 24 months postoperatively (Table 3).

In the MCLASS group, the complete success rates after 12 and 24 months were 60.0% and 53.3%, respectively. The qualified success rates after 12 and 24 months were 91.1% and 88.9%, respectively. In the TRAB group, the complete success rates after 12 and 24 months were 66.7% and 59.5%, respectively. The qualified success rates after 12 and 24 months were 83.3% and 80.9%, respectively. There was no significant difference in complete success rate and qualified success rate between the groups at 12 and 24 months postoperatively ($P = 0.519$, 0.561, 0.275 and 0.229, respectively).

In the TRAB group, the BCVA (LogMAR) decreased significantly at one week and one month postoperatively, $P < 0.05$. Visual acuity returned to 0.3 (0.1, 1.0) at 12 and 24 months, with no significant difference to preoperative BCVA. In the MCLASS group, the BCVA (LogMAR) decreased significantly on day 1 postoperatively from 0.3 (0.1, 0.5) to 0.7 (0.2, 1.0), $P < 0.001$. Visual acuity returned to 0.2 (0.1, 0.6) within one month after surgery and remained stable over the following 24 months ($P > 0.05$; Table 4). BCVA deterioration after TRAB seemed clinically more serious than after MCLASS at 12 and 24 months. However, no statistically significant differences were observed between the two groups at any of the time points postoperatively.

The overall rate of complications in the TRAB group was significantly higher than in the MCLASS group (95.2% versus 33.3%, respectively; $P < 0.001$; Table 5). In the TRAB group, all eyes received postoperative ocular digital massage, and subconjunctival injections of 5-FU were performed in 15 eyes (35.7%). Nine eyes (21.4%) suffered from early hyphaema, seven eyes (16.7%) experienced filtering bleb leakage, four eyes (9.5%) developed flattening of the anterior chamber, three eyes (7.1%) suffered from choroidal detachment, three eyes (7.1%) were found with postoperative hypotony accompanied by flat anterior chamber and choroidal detachment, filtering bleb fibrosis was observed in 13 eyes (30.9%) and cataract progression was seen in 12 eyes (28.6%) during the 2-year follow-up period.

In the MCLASS group, subconjunctival injections of 5-FU were performed in 12 eyes (26.7%). LGP was performed with the Nd:YAG laser in 21 eyes (46.6%). Two eyes (4.40%) suffered from early hyphaema, eight eyes (17.70%) experienced PAS (six eyes were treated with Nd:YAG laser, and two eyes received goniosynechialysis). Filtering bleb fibrosis was found in five eyes (11.1%), and cataract progression was seen in five eyes (11.1%) during the 2-year follow-up period. Notably, no case was complicated by iris incarceration, bleb leak or infection during the 24-month follow-up.

Discussion

Conventional penetrating TRAB is associated with more postoperative complications. NPDS has been developed as a safer and more acceptable surgical intervention for patients compared to conventional procedures, although it has been reported to be more technically difficult [7, 8]. In recent years, CLASS has been implemented using a CO2 laser to overcome the technical difficulty and obviate the prolonged

learning curve characteristic of manual NPDS; thus, it can be confidently performed by surgeons with a wide range of experience in filtration surgery. The efficacy of the CLASS procedure was at least comparable with that reported in a series of studies using manual NPDS [9]. However, some preliminary studies have suggested that the associated incidence of complications is unsatisfactory; the incidence of PAS and iris incarceration has been shown to be relatively high following CLASS and would reduce the success rate in East Asian POAG patients.

Considering the characteristics of Chinese POAG patients, we developed a modified CLASS procedure combined with preventive laser iris management and confirmed its long-term effectiveness and safety in our previous study [6]. The MCLASS approach highlighted several key points: 1) According to the gonioscopy, the widest superior angle position with sparse or uniform pigmentation and in which blood reflux in the SC was a priority to be chosen corresponded to the scleral site for ablation. 2) The broad-based and peripheral LPI was performed as close as possible to the root of the iris and centred in the expectant percolation area. ALPI was then applied, surrounding the LPI hole (at least 500 μm in width) within 1–3 days prior to the surgical procedure. 3) During surgery, we created a larger scleral flap of 5 × 5 mm compared to the regular 4 × 4 mm and a scleral lake that was large and deep enough to ensure increased levels of drainage and percolation of the aqueous humour. 4) We not only revealed the SC during surgery, but also used the CO2 laser to extend the area of ablation forwards to create a TDW. 5) At the end of the surgery, we sutured the scleral flap tightly using adjustable sutures.

Although both groups achieved a significant IOP decrease from baseline, there was a trend towards better IOP outcomes with MCLASS. Postoperative IOP in the MCLASS group was significantly lower than that of the TRAB group at 12 and 24 months. The MCLASS group achieved better IOP reduction at 12 and 24 months (50.7% versus 47.5% and 53.2% versus 40%, respectively). The extents of IOP reduction are in contrast with Jankowska-Szmul's study [10]. We think this is due to the modifications that we made, i.e. a larger scleral flap and a deeper scleral lake.

The results of MCLASS in our study were encouraging, with complete success rates of 60.0% at 12 months and 53.3% at 24 months and qualified success rates of 91.1% at 12 months and 88.9% at 24 months. While such results are consistent with those of a previous multicentre study, which showed a complete success rate of 60.2% and 57.9% after 12 and 24 months, respectively, and a qualified success rate of 79.6% and 91.2% after 12 and 24 months, respectively [11]. It is worth noting that more than 85% of the patients in the multicentre study were white and Hispanic, and the preoperative IOP and the extents of IOP reduction were both lower than those in current study. We have reason to believe that MCLASS is more suitable for more advanced and refractory Chinese POAG patients and has achieved a better IOP lowering effect and success rate.

There was no statistically significant difference when comparing the complete success rate and the qualified success rate in the MCLASS group and the TRAB group. The complete success rate of the TRAB group was slightly greater than that of the MCLASS group, whereas the qualified success rate of the smaller number of patients who required IOP-lowering

medications after MCLASS. In our study, the decrease in the number of antiglaucoma medications compared favourably with previous studies for CLASS [12]. Meanwhile, there was a significant difference in the number of therapeutic medications taken when compared between the two groups at 12 and 24 months postoperatively. MCLASS patients, compared with TRAB patients, required fewer medications to maintain the target IOP and a satisfactory range of IOP reduction.

BCVA deterioration after TRAB seemed more serious than after MCLASS at 12 and 24 months. In previous studies, cataracts were also more commonly reported after TRAB. Although the preoperative BCVA in the MCLASS group was lower than that in the TRAB group, the long-term visual acuity in the MCLASS group was better than that in the TRAB group, primarily because of less surgery-related cataract formation and development after MCLASS. This finding may be explained by the nonperforation of the eye, which greatly minimizes the effects of anterior chamber inflammation, medications and sudden IOP fluctuations on the lens.

In nonpenetrating surgery, peeling of the inner wall of the Schlemm canal and the use of Nd:YAG goniopuncture in the follow-up can control the IOP. LGP was suggested as a standard adjunctive practice to transform the technique from a non-penetrative approach into a micro-perforation approach, as this will prolong the increased flow of aqueous humour. Published studies on LGP following NPDS report an LGP rate of 41 to 63% [13–15]. In the current study, LGP was performed with the Nd:YAG laser in 21 eyes (46.6%). The modified procedure of the successful creation of a TDW during MCLASS surgery is the prerequisite for LGP. Although theoretically transforming to perforations, LGP was applied carefully in terms of site and the number of laser shots to ensure making only a micro-perforation that would rarely cause sudden hypotony, flat anterior chamber, incarceration and PAS.

In previous studies, complications appeared more common in the TRAB group. Similarly, in this study, complications caused by early postoperative overfiltration and filtering bleb fibrosis were almost inevitably encountered in the TRAB group, despite our technique of adjustable sutures tightening the scleral flap during the early phases and use of MMC during the operation. MCLASS has the obvious advantage of minimizing the complication of overfiltration and its sequelae; no MCLASS-treated eye showed hypotony or flat anterior chamber, even after LGP, whereas three eyes (7.1%) evinced hypotony, four eyes (9.5%) showed a shallow anterior chamber and three eyes (7.1%) suffered from choroidal detachment in the TRAB group. MCLASS-treated eyes also had a significantly lower incidence of hyphaema (4.4%) compared with TRAB (21.4%).

Certainly, late drainage failure has been well documented after TRAB, with subconjunctival fibrosis being strongly implicated [16]. In the current study, subconjunctival injections of 5-FU were performed in 15 eyes (35.7%) in the TRAB group and in 12 eyes (28.6%) in the MCLASS group; all eyes received postoperative ocular digital massage in the TRAB group, but not in the MCLASS group. However, despite aggressive bleb revision, 13 eyes (30.9%) showed subconjunctival fibrosis, resulting in the disappearance of subconjunctival blebs in patients after TRAB, compared to only five eyes (11.1%) in the MCLASS group. [illegible] are after MCLASS surgery, although a majority of the

filtration blebs were flat and nonfunctional. This may be related to the mechanism of aqueous drainage in non-penetrating trabecular techniques, although it is uncertain. It has been postulated that after CLASS, drainage may be either through the subconjunctival pathway, but more commonly through the SC and episcleral veins, via increased uveoscleral outflow from intrascleral and suprachoroidal pathways [17, 18]. In our previous study, we found that once the intrascleral lake had formed, the IOP was not dependent upon the overlying blebs. We believe that since there are more drainage channels after MCLASS than TRAB, once the subconjunctival space collapses, TRAB will have a greater impact on postoperative IOP increase; IOP is then more difficult to control.

Stegmann et al. postulated that failure of drainage after nonpenetrative surgery might occur because of PAS forming over the Descemet's window or excessive fibrosis reducing drainage through the window or closing the ostia of SC [19]. The incidence of PAS and iris incarceration has been shown to be relatively high following CLASS. By the modified procedures of performing preventive LPI + ALPI within the percolation area, ablating further forwards the TDW but without penetration, and administering pilocarpine as postoperative treatment, we effectively prevented incarceration and PAS after surgery; no case was complicated by incarceration, and only eight eyes (17.70%) experienced PAS. We recommend careful postoperative examinations, including gonioscopy and UBM, to recognize and treat scleral lake fibrosis early and prevent PAS or iris incarceration, to avoid the failure of operation and reoperation. The incidence of postoperative complications was significantly lower after MCLASS. This group showed no incidence of surgery related to choroidal detachments, flat anterior chambers or hypotony, and had less hyphaema than the TRAB group. A similar lower rate of complications was also described by El Sayyad et al. [20].

To the best of our knowledge, we are the first to have conducted a long-term comparison between MCLASS and conventional TRAB. In our study, MCLASS achieved a significant IOP decrease from baseline, a reduction in medications, and a lower number of complications compared to TRAB up to 24 months; therefore, we can affirm that this highly promising technique can be considered a valid alternative to the classical method. However, there are several limitations to our study that need to be considered. First, this was a single-centre retrospective comparative study. A randomized prospective study with longer follow-up is required to further evaluate and substantiate the safety and long-term efficacy of the MCLASS procedure and to compare the outcomes to standard TRAB. Second, we did not compare the non-modified CLASS with TRAB, but we have reason to believe that MCLASS is safer and more effective for the Chinese population based on our previous study [6].

In conclusion, the MCLASS procedure was found to be as efficient as TRAB in terms of success rates over 24 months. Of paramount importance is the finding that MCLASS is associated with more IOP reduction, fewer medications and a lower risk of complications compared to TRAB.

Declarations

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Authors' contributions: YZ wrote the main manuscript text and prepared all talbes. JM, LL and GWC oversaw the project and assisted with the writing of the manuscript. QZ, SHZ and ALB performed ophthalmic examinations. All authors reviewed the manuscript.

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Tables

Table 1. Demographic characteristics

	MCLASS	TRAB	*P* value
N (%)	45(51.7%)	42(48.3%)	
Male N (%)	25(55.6%)	23(78.6%)	0.556*
Age	55.111.5	54.213.5	0.425†
Pre-IOP (mm Hg)	28.29.6	29.510.3	0.552†
Pre-medications	3.5(3,4)	3(3,4)	0.668‡
Pre-Op BCVA (LogMAR)	0.3(0.1,0.5)	0.2(0.0,0.5)	0.208‡
Pre-Op VF			
Mild	6	9	0.318
Moderate	14	9	0.306
Advanced	25	24	0.881

MCLASS: modified CO2 laser-assisted sclerectomy surgery; TRAB: trabeculectomy; IOP: intraocular pressure; BCVA: best corrected visual acuity VF: visual field

* Chi-squared test. † t-test [age normally and intraocular pressure (IOP) distributed in both groups]. ‡ Wilcoxon two-sample test (medications non-normally distributed in both groups).

Table 2. IOP at baseline, 1 day, 1 week and at 1, 3, 6, 12, and 24 months following MCLASS and TRAB

IOP (mmHg)	MCLASS (mean±SD)	TRAB (mean±SD)	*P* value
Preoperatively	28.2±9.6	29.5±10.3	0.552
1 week	8.1±3.2	11.1±4.9	0.001
1 month	14.8±5.5	13.1±4.0	0.117
3 months	12.8±3.3	14.1±4.7	0.166
6 months	13.3±2.7	14.6±4.9	0.124
12 months	13.9±2.5	15.5±3.7	0.039
24months	13.4±2.9	17.7±4.1	<0.001

MCLASS, modified CO2 laser-assisted sclerectomy surgery; TRAB, trabeculectomy; IOP, intraocular pressure; SD, standard deviation

Table 3. Number of antiglaucoma medications before and after surgery in the MCLASS and TRAB group

Glaucoma medications	MCLASS [Median (Q1, Q3)]	TRAB [Median (Q1, Q3)]	*P* value
Preoperatively	3.0(3,4)	3.5(3,4)	0.688
12 months	0(0,1)	1(0,1)	0.023
24 months	0(0,1)	1.5(1,2)	<0.001

MCLASS, modified CO2 laser-assisted sclerectomy surgery; TRAB, trabeculectomy; Q1: lower quartile; Q3: upper quartile

Wilcoxon paired signed rank test between baseline and post-baseline values.

Table 4. LogMAR BCVA at baseline, 1 week and 1, 12, and 24 months postoperatively

BCVA (LogMAR)	MCLASS [Median (Q1, Q3)]	TRAB [Median (Q1, Q3)]	*P* value
Preoperatively	0.3(0.1,0.5)	0.2(0.0,0.5)	0.208
1 week	0.7(0.2,1.0)	0.35(0.1,1.0)	0.148
1 month	0.2(0.1,0.6)	0.45(0.2,0.5)	0.237
12 months	0.2(0.1,0.6)	0.3(0.1,1.0)	0.472
24months	0.25(0.1,0.6)	0.4(0.1,1.2)	0.059

BCVA: best corrected visual acuity; MCLASS, modified CO2 laser-assisted sclerectomy surgery; TRAB, trabeculectomy; Q1: lower quartile; Q3: upper quartile.

Table 5. Surgical complications associated with MCLASS or TRAB during the 2-year follow-up period.

Complications	MCLASS n (%)	TRAB n (%)	*P* value
Hyphaema	2 4.4	9 (21.4)	0.018
hypotony	0	3 (7.1)	0.068
Shallow anterior chamber	0	4 (9.5)	0.034
Choroidal detachment	0	3 (7.1)	0.068
Iris incarceration	0	0	1.000
Macular edema	0	1 (2.4)	0.298
Peripheral anterior synechiae	8 (17.7)	8 (19)	1.000
Cataract development and progression	5(11.1)	12(28.6)	0.040
Endophthalmitis	0	0	1.000
Total number patients with complications	15 (33.3)	40 (95.2)	<0.001

MCLASS, modified CO2 laser-assisted sclerectomy surgery; TRAB, trabeculectomy