Safety, Efficacy and Outcome of CO_2 Laser-Assisted Sclerectomy Surgery (CLASS) in eyes with Primary Open Angle Glaucoma (POAG)

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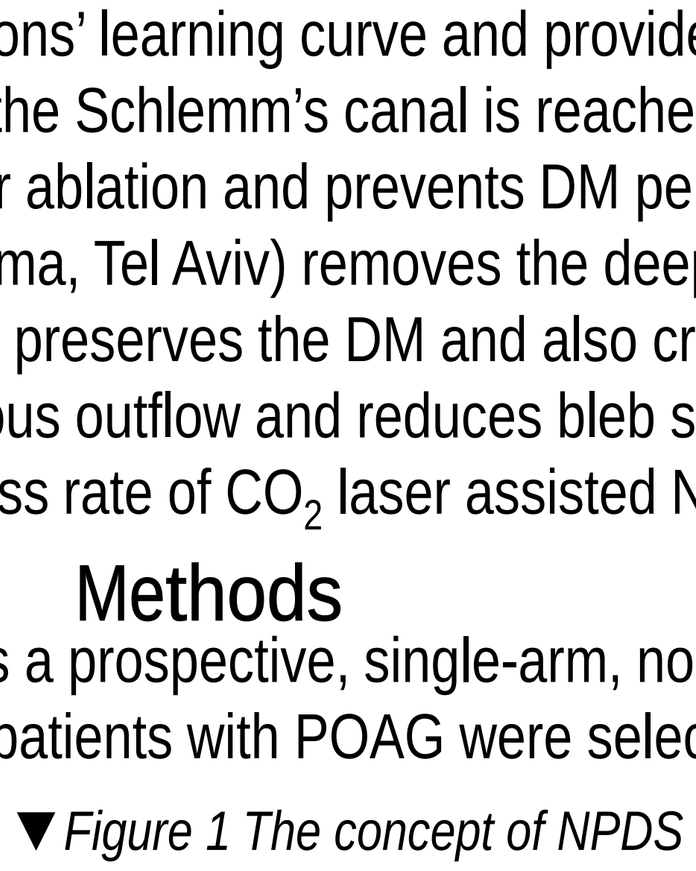
Introduction

Non-penetrating deep sclerectomy (NPDS) aims at raising the safety profile of drainage surgery without compromising the efficacy of trabeculectomy by leaving the Descemet's membrane (DM) intact and avoid anterior chamber entry. However, it is technically demanding; inadequate percolation or perforation of DM are not uncommon. CO_2 Laser-Assisted Sclerectomy Surgery (CLASS) has the potential of shorten the surgeons' learning curve and provide more predictable outcome. It is effective in ablating dry sclera and once the Schlemm's canal is reached, the laser energy is absorbed by the percolating fluid, thus prevents further ablation and prevents DM perforation. In CLASS, CO_2 laser emitted by the IOPtiMate^{TM} System (IOPtima, Tel Aviv) removes the deeper layer of scleral and limbal tissue, this "un-roofed the Schlemm's canal, preserves the DM and also creates a scleral lake (Figure 1); the latter allows room for subchorodial aqueous outflow and reduces bleb size. The purpose of this study is to investigate the safety, efficacy and success rate of CO_2 laser assisted NPDS.

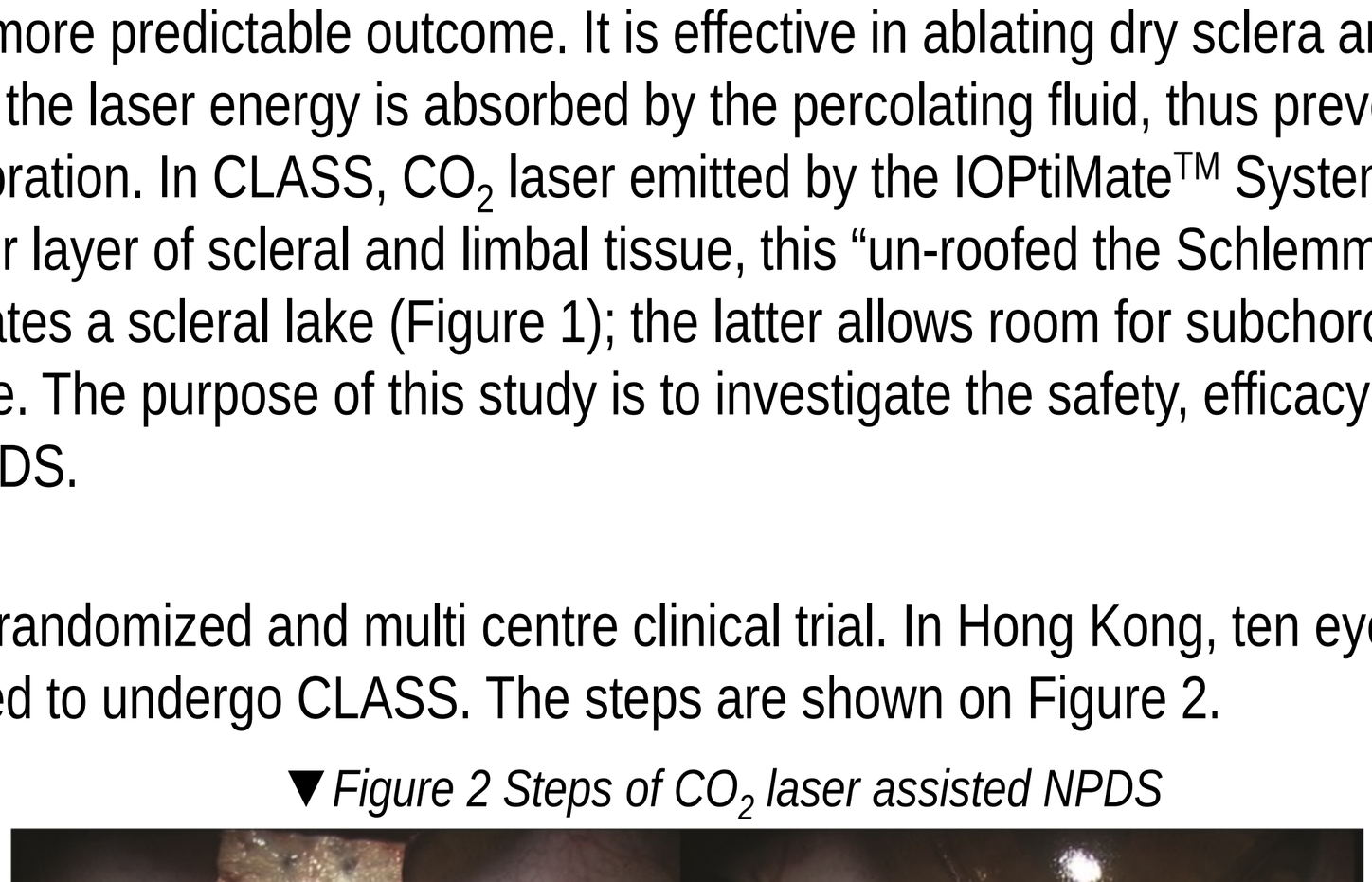
Methods

This is a prospective, single-arm, non-randomized and multi centre clinical trial. In Hong Kong, ten eyes of 10 patients with POAG were selected to undergo CLASS. The steps are shown on Figure 2.

▼*Figure 1 The concept of NPDS*



▼*Figure 2 Steps of CO_2 laser assisted NPDS*



Results

One eye had extensive superior anterior synechiae and was excluded from the study. The baseline demographics, mean IOP and mean number of medications used before and after CO_2 laser assisted NPDS are listed on table 1. Complications and additional procedures required after NPDS are listed on table 2. Statistical analysis was not performed as only 9 patients were involved.

Baseline demographics (Total no. of patients = 9)	
Age	63.0 ± 12.2
Male: Female	8:1
Right: Left eye	6:3
Best correct visual acuity	0.54 ± 0.34
Cup-to-disc ratio	0.88 ± 0.12
Pre-operative IOP	21.2 ± 7.0 (11-34)
Mean number of IOP lowering agents (range), per eye	3.9

◄*Table 1 Baseline demographics*

	IOP(range), in mmHg	Mean no. IOP lowering agents (range), per eye
Pre-operative IOP	21.2 ± 7.0 (11-34)	3.9
Post-operative IOP, month 6	15.3 ± 7.4 (6-28)	0.9
Post-operative IOP, month 12	16.9 ± 5.6 (8-24)	1.2

	Complications/ Additional procedures	No. of eyes
Early-post-operative complications	Hypotony (IOP≤6mmHg)	4
	Conjunctival wound leak	1
	Iris adhesion to DM window	1
Late post-operative complication	Visual lost (>0.2 logMar)	1
	Encapsulated bleb	1
	Iris adhesion to DM window	3
Additional procedure to achieve adequate IOP control (< 21mmHg)	YAG laser goniopuncture	4
	Needling +5 FU injection	3
	Suturelysis	2

►*Table 2 Post-op IOP, complications and manipulations*

Conclusions

Preliminary results shows that CLASS is a safe and effective approach of performing NPDS. Close follow-up and additional procedures are required. Further study is required to assess its long-term outcomes compared to the manual technique.