

Long-term Efficacy of Micropulse Diode Transscleral Cyclophotocoagulation in the Treatment of Refractory Glaucoma

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Purpose

The objective of this study is to evaluate and present the long-term efficacy of micropulse diode transscleral cyclophotocoagulation (MPCPC) in subjects with refractory glaucoma treated from a prior prospective study.

Results

 Table 1. Patient demographics & characteristics

Age Mean (SD) Min: Max Sex, n (%) Male Female

59.9(15.7) 23:80 7 (50%) 7 (50%)

Results

Figure 1. Micropulse Diode Cyclophotocoagulation

Study Design Retrospective Case Series

Study Population

All patients with refractory, end-stage glaucoma, unresponsive to alternative treatment.

Methods

This is a retrospective review of the cases treated with micropulse cyclophotocoagulation in a previous randomized exploratory study¹. Patients with advanced glaucoma having IOP of >21 mmHg on maximal, tolerated, medical therapy with or without previous surgical intervention and visual acuity of 6/60 or worse were included.Micropulse diode transscleral cyclophotocoagulation (MPCPC) was delivered with laser power set at 2Watts, 100s pulse envelop with 0.5ms **ON** and 1.1ms **OFF** delivering 62.6Joules per treatment (Iris Medical Instruments Inc., Mountain View, CA, USA) Intraocular pressure (IOP) and number of anti-glaucoma eye drops were recorded from 6 months to the last follow-up visit of about 6.5 years (range 36 – 96 months).

Ethn	icity, n	(%)			
Chinese				11	(78%)
Malay				3	(22%)
ivie.				•	(/0)
Eves	s n (%)				
Die	Right				(20%)
l oft				4	(23/0)
				10	(/1%)
Diagnosis, n (%)					
POAG				2	(14%)
PACG				5	(36%)
NVG				4	(29%)
Juvenile glaucoma				2	(14%)
Secondary glaucoma				1	(7%)
Secondary gladcoma i (170)					
Table 2. IOP pre & post MPCPC					
Patient	PRE	POST	POST	POST	POST
	LASER	LASER	LASER	LASER	LASER
		6 MOS.	12	18	78
	10		MOS.	MOS.	MOS
1	42	22	17	18	23
2	50	26	24	22	38
3	60	20	20		00
4	E 2	20	10	20	28
	53 62	30 19	18	20 23 24	28 21 29
5	53 62	30 18 20	18 18 18	28 23 24 20	28 21 28 28
5 6 7	53 62 56 34	30 18 20 24	18 18 18 18 14	28 23 24 20 16	28 21 28 23 16
5 6 7 8	53 62 56 34 22	30 18 20 24 18	18 18 18 18 14 18	28 23 24 20 16 16	28 21 28 23 16 20
5 6 7 8 9	53 62 56 34 22 30	30 18 20 24 18 18	18 18 18 18 14 14 18 18 14	28 23 24 20 16 16 16 14	28 21 28 23 16 20 26
5 6 7 8 9 10	53 62 56 34 22 30 26	30 18 20 24 18 18 12 14	18 18 18 18 14 18 18 18 14 14 16	28 23 24 20 16 16 14 14	28 21 28 23 16 20 20 26 18
5 6 7 8 9 10 11	53 62 56 34 22 30 26 32	30 18 20 24 18 12 14 12	18 18 18 18 14 14 18 14 14 16 16 12	28 23 24 20 16 16 14 14 16 16 14	28 21 28 23 16 20 20 26 18 18 21
5 6 7 8 9 10 11 11 12	53 62 56 34 22 30 26 32 32 73	30 18 20 24 18 18 12 14 12 12 46	18 18 18 18 14 14 18 14 16 16 12 32	28 23 24 20 16 16 14 16 16 14 16 14 28	28 21 28 23 16 20 20 26 18 18 21 21 56
5 6 7 8 9 10 11 11 12 12 13	53 62 56 34 22 30 26 30 26 32 73 73 22	30 18 20 24 18 18 12 14 12 14 12 46 7	18 18 18 18 14 14 18 14 16 16 12 32 32 12	28 23 24 20 16 16 14 16 14 16 14 28 28 16	28 21 28 23 16 20 20 20 26 18 21 21 56 56 18
5 6 7 8 9 10 11 11 12 12 13 13 14	53 62 56 34 22 30 26 30 26 32 73 73 22 38	30 18 20 24 18 18 12 14 12 46 7 24	18 18 18 18 14 18 14 18 14 18 14 12 32 12 22	28 23 24 20 16 16 14 16 14 28 28 16 16 20	28 21 28 23 16 20 20 20 20 20 20 20 20 20 20 20 20 20
5 6 7 8 9 10 10 11 12 12 13 13 14 14 Mean	53 62 56 34 22 30 26 30 26 32 73 73 22 38 38 43.3	30 18 20 24 18 18 12 14 12 46 7 46 7 24 20.9	1818181414181416123212321212121212121212132	28 23 24 20 16 16 14 16 14 28 16 28 16 20 19.6	28 21 28 23 16 20 26 18 21 56 18 56 18 56 18 18
5 6 7 8 9 10 10 11 11 12 12 13 13 14 14 14 14 14 14 14 14 5d	53 62 56 34 22 30 26 30 26 32 73 22 38 43.3 38 43.3 16.8	30 18 20 24 18 12 12 14 12 46 7 24 20.9 9.5	181818141418141612321232125.3	28 23 24 20 16 16 14 16 14 28 16 28 16 20 19.6 4.8	28 21 28 23 16 20 20 26 18 21 56 18 56 18 18 12 24.8 12
5 6 7 8 9 10 10 11 12 12 12 13 12 13 14 14 14 14 14 14 14 14 14 5d 8 5d 8 5d	53 62 56 34 22 30 26 32 26 32 73 22 38 43.3 16.8	30 18 20 24 18 12 12 14 12 46 7 46 7 24 20.9 9.5 9.5 0.00	18 18 18 18 14 18 14 16 16 12 32 12 32 12 22 18.2 5.3 0.01	28 23 24 20 16 16 14 16 14 28 16 28 16 28 16 20 19.6 4.8 0.00	28 21 28 23 23 16 20 20 26 18 21 56 18 56 18 56 18 21 56 18 21 56 18 21 56 18









Results

There were 14 patients (61%) out of the 23 treated with MPCPC in the prior randomized study who had follow-up review up to 78 months. Mean IOP recorded was listed in Table 2 and IOP trend was shown in Figure 2. The number of eye drops was presented in Figure 3. Attrition rate after 6.5 years was 9 (39%) out of 23 patients with 5 lost to follow-up, 2 deceased & 2 had ocular surgery (1glaucoma drainage implant surgery & 1 enucleation).

Discussion

Micropulse diode transscleral cyclophotocoagulation has emerged as a new treatment option for glaucoma.^{1,3} Instead of the conventional, continuous train of high intensity energy application, a series of repetitive short pulses of energy with rest period in between is delivered in a micropulse mode. Early works of Tan, Chew et al.³ found it effective & safe in lowering IOP by ≥30% with consequent reduction in medications. In a prior randomized comparison study¹, MPCPC treated eyes resulted to 45% IOP reduction from baseline but with similar number of medications after 18 months.



Duration of follow-up in Months

Conclusion

Micropulse diode transscleral cyclophotocoagulation was effective in the long term IOP control of refractory glaucoma.

This retrospective review was limited by the small number of sample size and the attrition rate after many years of follow-up.

Significant IOP reduction was observed at all time points compared to pre-treatment IOP. About 67% of the 14 patients had 39% (range 31-68%) mean IOP reduction from baseline even after a mean of 78 months. The remaining 33% treated patients had 17% (range 9-24%) IOP reduction on the average. No significant difference in eye drops noted pre & post laser.

This retrospective review of the same group of patients from the randomized comparison of Aquino et al. with longer follow-up of 78 months showed 39 % IOP reduction. Frezzotti et al.² reported a 38.7% IOP reduction after 42 months of continuous wave diode transscleral CPC without a change in the number of glaucoma medications.

References

- MCD Aquino, K Barton, AM Tan, C Sng, X Li, SC Loon, & PTK Chew. Micropulse versus continuous wave transscleral diode cyclophotocoagulation in refractory glaucoma: a randomized exploratory study. Clin Exptl Ophthalmol 2015; 43: 40-46.
- 2. P Frezzotti, V Mittica, G Martone et al. Longterm follow-up of diode laser transscleral cyclophotocoagulation in the treatment of refractory glaucoma. Acta Ophthalmologica 2010; 88:150-155.
- 3. AM Tan, M Chockalingam, MCD Aquino, Z Lim, JLS See & PTK Chew. Micropulse transscleral cyclophotocoagulation in the treatment of refractory glaucoma. Clin Exptl Ophthalmol 2010; 38:266-272.
- 4. Moorman CM and Hamilton AM. Clinical applications of the Micropulse diode laser. Eye 1999 Apr; 13(pt2): 145-50.

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