Transscleral Diode Laser Cyclophotocoagulation usage during pandemic restrictions: Experience at University Hospital Hairmyres

Mustafa Franka, Mohanad Moustafa, Amit Datta

University Hospital Hairmyres, East Kilbride, Scotland, UK

Introduction

Transscleral diode cyclophotocoagulation (TSCPC) uses 810 nm light in the near-infrared region and achieves a reduction in the intraocular pressure (IOP) by the destruction of the pigmented ciliary epithelium and reducing aqueous production (1). Recent studies have shown a shift favouring micropulse diode cyclophotocoagulation (mpTSCPC) over TSCPC and also increasing the use of mpTSCPC earlier in glaucoma management and in eyes with better visual potential than those eyes that conventionally underwent TSCPC (2). mpTSCPC uses approximately 30% of the total energy of TSCPC. This is achieved by cycling the laser on and off to deliver laser energy to ciliary body (3).

As we are going through the pandemic due to COVID19, it has brought in frequent lockdowns, limited social interactions and resulted in severe restrictions on available resources. This has created a situation where eyes that require urgent Trabeculectomy has become challenging to deliver in the required timescale. Therefore it was proposed to trial mpTSCPC to look whether it would adequately and safely lower IOP for the short term.

Aims

To audit the effectiveness and safety of mpTSCPC in patients with uncontrolled glaucoma treated at University Hospital Hairmyres hospital.

Methods

Audited the patient case notes of 18 consecutive patients (24 eyes) retrospectively that had mpTSCPC at University Hospital Hairmyres between April 2020 and August 2020. The case notes were harvested for the patient's age, gender, the type of glaucoma, pre and post laser intraocular pressure (IOP) on Goldmann applanation tonometry, intraoperative and postoperative complications, number of pressure lowering medications used and best corrected visual acuity (BCVA). The respective metrics were gathered from the patient case notes using a standardised collection tool looking at the baseline and all the subsequent follow ups, and then the data imported digitally to analyse and interpret using Microsoft Excel and GraphPad Prism. Iridex Cyclo G6® Glaucoma Laser System with MicroPulse P3® Glaucoma Device was used. All the patients were done under peri-bulbar blocks.

Results

Twenty four eyes of 18 patients (M:F, 8:10) were included, with an average age of 69.5±12.1 (range 51-90). Average length of follow up was 4 months (range 3-7months). Glaucoma types shown in **Table 1**. Complications frequencies are summarised in **Table 2**.

- Mean IOP at last follow up was 19.7±7.6mmHg compared with a mean baseline IOP of 22.5±7.9mmHg. Average change in IOP from baseline being a decrease of 2.9±6.3mmHg (**Figure 1**).
- IOP reduction of >20% from baseline was achieved in 50% of eyes (**Figure 2**).
- Mean number of medications at last follow up was 2.7±0.9 compared with a mean baseline number of medications was 3.2±1.2 (**Table 3**).
- No significant change in BCVA post operatively in those with a pre-op BCVA better than 0.5 Log MAR (**Figure 3**).

Table 1

Glaucoma Type	Percentage
POAG	33%(N=8)
NEOVASCULAR	8%(n=2)
UVEITIC	13%(n=3)
ACG	38%(n=9)
PDG	8%(n=2)

Table 2

Complication	Frequency
Mild Discomfort	1
Moderate Discomfort	0
Severe Discomfort	1
Uveitis/ inflammation	1
Dry Eye	1
Phthisis/ hypotony	0
CMO	1

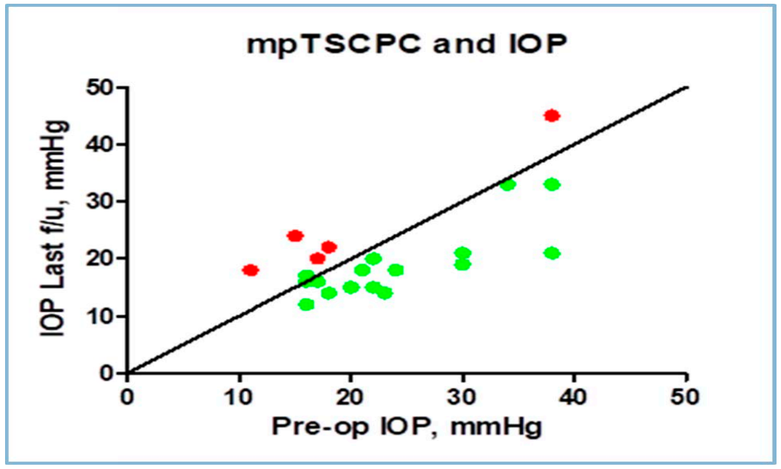

Figure 1: Comparison of Pre-operative IOP compared with IOP on last Follow up. Black line represents line of no change, green dots below the line represent eyes were IOP was lower on last follow up compared to baseline.

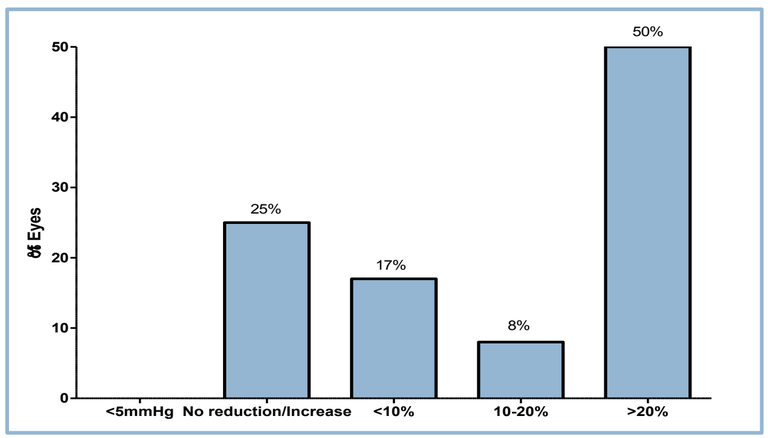

Figure 2: Percentage change in IOP from baseline.

TABLE 3 Study	No. of eyes	No. of patients	Power (mW)	Duration (Seconds)	Baseline IOP lowering medication	Decrease in IOP lowering medication	Further incisional surgery	Repeat Laser	Final f/up (mo)
Toyos et al(4) (2020)	26	13	2000	160	3.3	1.8	None	7.6%	6-12
UHH cohort (2020)	24	18	2000	160	3.2±1.2	2.7±0.9	None	4.2%	3-7

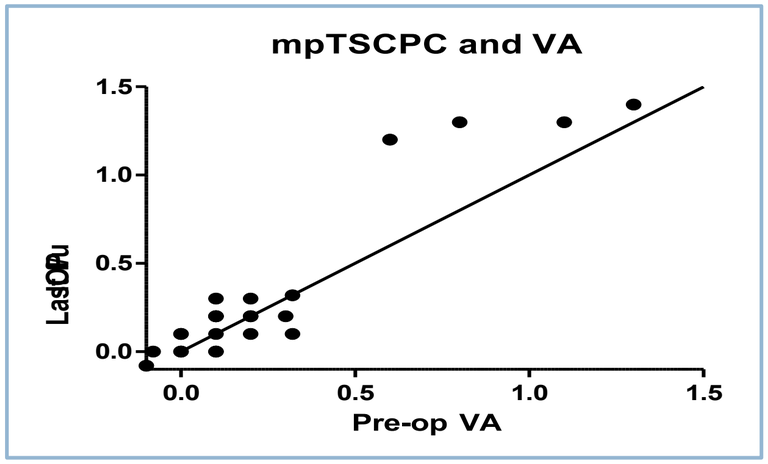

Figure 3: Comparison of Pre-operative BCVA compared with BCVA on last Follow up in LogMAR. Black line represents line of no change, 1.1, 1.2 and 1.3 represent CF, HM and POL respectively.

Discussion

Being a relatively new modality, available literature on mpCPC is far from complete. Harry Quigley elegantly highlights the shortcomings in literature in a recently published editorial (5). One of the obvious challenges for this procedure is the fact that there are no audible or visual cues for intraoperative titration. This may result in increased complication rates or decreased efficacy in depending on the variable pigmentation in the eyes. The mechanism for IOP reduction and the rationale for claimed better efficacy is also not very convincing. The claimed mechanism of IOP reduction in mpCPC is by increasing uveoscleral outflow. Neither this mechanism of mpCPC nor its superiority or difference in inflow or outflow compared to CPC has been proven. That said, mpTSCPC does lend itself to repeat treatment. In our small series our retreatment rate is low (4,5). There are 25% of eyes who did not respond well to the first session and some of them have been relisted for a repeat procedure.

Conclusion

Prospective comparative studies, with homogeneous success criteria definitions and longer follow-up periods, are necessary to precisely determine mpTSCPC's ideal parameters, especially evaluating the individual characteristics of each patient and their glaucoma. What we have learnt in our centre in the context of the COVID-19 pandemic and managing patients with advanced glaucoma:

1. mpTSCPC can be used with caution in select group of patients.
2. It may be used currently as a temporising measure rather than a long term solution.
3. It has allowed us to avoid or postpone trabeculectomy for the short term.

References:

1. Tan AM, Chockalingam M, Aquino MC, Lim ZI-L, See JL-S, Chew PT. Micropulse transscleral diode laser cyclophotocoagulation in the treatment of refractory glaucoma. Clin Experiment Ophthalmol. 2010 Apr;38(3):266–72.
2. Philip R, George R. Micropulse diode cyclophotocoagulation: A review of the literature. Kerala J Ophthalmol [Internet]. 2020 May 1;32(2):136–42. Available from: http://www.kjophthal.com/article.asp?issn=0976-6677
3. Aquino MC, Lim D, Chew PT. Micropulse P3™ (MP3) Laser for Glaucoma: An Innovative Therapy. Vol. 12, Journal of current glaucoma practice. 2018. p. 51–2.
4. Toyos M, Toyos R. Clinical Outcomes of Micropulsed Transcleral Cyclophotocoagulation in Moderate to Severe Glaucoma. J Clin Exp Ophthalmol. 2016 Jan 1;07.
5. Quigley HA. The Need for Rigor in Evaluating Micropulse and Other New Procedures. Vol. 3, Ophthalmology. Glaucoma. United States; 2020. p. 171–3.

Financial support and sponsorship
Nil.
Conflicts of interest
None.